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ABSTRACT

As part of the first year activities of the Northeast Academic Science Information Center (NASIC), a survey was made of existing bibliographic information centers and information processing activities across the country. Reports are presented on the activities of each of the 11 centers identified. A bibliography of information about computerized information systems is also presented, along with two papers which briefly describe the status and goals of the NASIC project. (JY)

ED 094756

NORTHEAST ACADEMIC SCIENCE
INFORMATION CENTER
(NASIC)

PHASE I REPORT

(March 1973 - February 1974)

VOLUME 3

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EDUCATION & WELFARE
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IR 000 956

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A Study of the Feasibility of Marketing Bibliographic and Census Data-Base Products and Services via the Northeast Academic Science Information Center

Submitted to

The New England Board of Higher Education

January 1974

CAPITAL SYSTEMS GROUP, INC.

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I. INTRODUCTION

A. Background

In the last several years, most major bibliographic processors of scientific literature have begun to produce computer-readable versions of their published journals; a number of computerized bibliographic services have also sprung up that do not derive from antecedent printed journals. In addition, a number of non-bibliographic collections of regularly-updated information have been issued in machine-readable form; the tapes derived from the U.S. Census data base are one such resource.

The potential utility of these data bases, however, has not yet led to their frequent or widespread use. There seem to be two basic reasons for this. First, the data bases are a relative novelty, and users must become aware of their existence, sensitive to the benefits that can accrue from their use, and knowledgeable as to how to use them. Second, the users must be able to gain access to the data bases, either directly or through some intermediary. This can be prohibitively costly and cumbersome. Computer processing requires elaborate equipment, and is expensive in itself. It requires the solution of technical problems, the acquisition and installation of software systems (which are often expensive), and the acquisition of the data bases--which are also generally costly, especially when compared with their printed counterparts.

The New England Board of Higher Education (NEBHE) has evolved a concept based on "intermediary" services, embodied in the Northeast Academic Science Information Center (NASIC), to reduce these problems and capitalize on a potential opportunity. NASIC seeks to cope with problems pertaining to awareness of data bases, and access to them, in three general ways: by eliminating physical access from the user's concern while hastening access to the data bases; by bringing computerized services within financial reach of a large community of users; and by providing special services to promote awareness of data bases and to assist in their use.

Under a contract from NEBHE, Capital Systems Group, Inc. (CSG) has conducted a study to identify, describe, and assess, in a preliminary way, the market for NASIC services. The results of that study are presented in this report.

B. Purpose

The study was designed to determine what services, derived from computerized bibliographic data bases and the U.S. Census data base, NASIC might profitably provide to each of four groups in the Northeast:

1) Academic institutions (colleges and universities)*
2) Non-profit research organizations
3) State and local governments
4) Commercial and industrial organizations.

The study also surveyed commercially available data bases to determine which, of those that might be available to NASIC, would be likely to interest the various groups of potential users.

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*At NEBHE's direction, medical schools, schools of pharmacy, and other professional schools were excluded from this study.

Among the user groups, the three first-named were to receive particular attention in this study; the commercial sector was considered to be of less immediate interest.

C. Scope and Limitations

The study was concerned with the possibility of marketing any and all services derivable from computerized bibliographic data bases and the U.S. Census tapes to each of the first three groups named above. These three groups were studied in some depth, both as to their general characteristics and, in particular, concerning their likely interest in services that NASIC might provide. This examination included both the collection of general information of interest to NASIC and the conduct of case studies. The commercial sector was examined in a much more general way; no case studies were performed. (A detailed description of the methodology employed in the study is presented in Appendix A; this includes a description of the selection criteria, lists of the institutions studied, and samples of the survey instruments.)

The study was conducted under strict temporal and financial constraints. These dictated that the samples of organizations selected for direct study be very small, and that the amount of time and attention devoted to each institution be held to the minimum that would provide basic marketing-relevant information. The study team therefore avoided any attempts at quantifying their findings, but concentrated on producing a qualitatively correct description. Although these points should be taken as a precaution against over-generalizing from the study results, the relatively high consistency of findings among diverse institutions heightened the study team's confidence that they had, in fact, managed to develop a substantially complete and accurate appraisal of each of the sectors studied.

D. Presentation of Study Results

The contents of the report fall into three logical units:

1. Profiles of the four potential markets;
2. Discussions of the market potential of services derived from the bibliographic and census data bases;
3. A summary of study findings, followed by the recommendations that the study team drew from them.

E. Acknowledgments

CSG offers its thanks to the many organizations and individuals who cooperated in this study. The staff of NEBHE and NASIC provided continual guidance and constructive criticism. The Universities and Nonprofit Institutions Studies Group of the National Science Foundation's Division of Science Resources Studies provided much background information; Ms. Suzanne Sale, in particular, gave very freely of her time, knowledge, and documentary resources to provide statistical information that would not otherwise have been available. Finally, and most importantly, CSG thanks the respondents in the institutions included in the survey. Their willingness to take time from their many pressing duties--often on very short notice--was essential to CSG's timely completion of the survey work.

F. Project Staff

The following persons collaborated in this study:

William A. Creager, Project Director

Jon L. Spargur, Associate Project Director

Professor Paul R. Dommel (Holy Cross College), Adjunct Associate

Professor Philip G. Kuehl (University of Maryland), Adjunct Associate

John M. Strawhorn

Donna M. Ewing

II. PROFILE OF THE POTENTIAL ACADEMIC MARKET

According to the U.S. Office of Education, in 1971 there were 760 institutions of higher education in the 10-state region to be served by NASIC, as follows:

EXHIBIT II-1

Number of Academic Institutions
in the Northeastern U.S., by State

Connecticut	57
Delaware	9
Maine	27
Massachusetts	126
New Hampshire	20
New Jersey	65
New York	250
Pennsylvania	172
Rhode Island	15
Vermont	19
Total	760

This tally, however, includes a large number of junior colleges, community colleges, and technical schools; the number of regular four-year colleges and universities is much smaller.

Even to limit consideration to four-year colleges and universities, however, would exaggerate the size of the potential academic market. The data bases around which NASIC intends to develop its services are, basically, tools for research workers. Moreover, NASIC's services will be sold, rather than offered gratis, so institutions will have to make budget allocations for their use.

To the extent that there is an academic market for NASIC, therefore, it will be among those institutions that are committed to scientific research, and that have the financial resources to pay for NASIC's services.

One of the best general indicators of commitment to research is the offering of doctoral programs in the sciences. Applying this restriction to schools in the Northeast, the potential academic market shrinks considerably. Exhibit II-2 lists colleges and universities that offer doctoral programs, and that appear to have programs in the sciences (medical schools and other professional schools have been excluded); their geographic distribution is shown in Exhibit II-2A.

Another measure of a school's commitment to research, as well as of its ability to pay for services that support research, is the amount of funded research carried on at the institution (measured in dollars). Exhibit II-3 displays the aggregate levels of federal funding of R&D activities in colleges and universities in the Northeast, by state. Exhibit II-4 shows the level of federal support of R&D in each of the schools included in this study; Exhibit II-5 shows their geographic distribution. Exhibit II-6 lists the colleges and universities in the Northeast that were among the 100 major recipients of federal funding for science in FY 1972.

Both of these general indicators--the existence of extensive programs of graduate education, and the level of funded research--emerged as important factors during the course of the interviews that CSG conducted. Their significance will be discussed later in this report, primarily in Chapter VII.

EXHIBIT II-2

Selected Colleges and Universities in the Northeast Offering Doctoral Programs*

Connecticut

1. University of Connecticut (Storrs)
2. Wesleyan University (Middletown)
3. Yale University (New Haven)

Delaware

4. University of Delaware (Newark)

Maine

5. University of Maine (Orono)

Massachusetts

6. Boston College (Boston)
7. Boston University (Boston)
8. Brandeis University (Waltham)
9. Clark University (Worcester)
10. Harvard University (Cambridge)
11. Lowell Technological Institute (Lowell)
12. Massachusetts Institute of Technology (Cambridge)
13. Northeastern University (Boston)
14. Tufts University (Medford)
15. University of Massachusetts (Amherst)
16. Worcester Polytechnic Institute (Worcester)

New Hampshire

17. Dartmouth College (Hanover)
18. University of New Hampshire (Durham)

New Jersey

19. Fairleigh Dickinson University (Teaneck)
20. Newark College of Engineering (Newark)
21. Princeton University (Princeton)
22. Rutgers University (New Brunswick)
23. Seton Hall University (South Orange)
24. Stevens Institute of Technology (Hoboken)

New York

25. Adelphi University (Garden City)
26. CUNY Bernard Baruch College (New York)
27. CUNY Brooklyn College (Brooklyn)
28. CUNY Graduate Division (New York)
29. CUNY Hunter College (New York)
30. CUNY Lehman College (Bronx)
31. Clarkson College of Technology (Potsdam)
32. Columbia (Main Division) (New York)
33. Columbia (Teachers College) (New York)
34. Cornell University (Ithaca)
35. N.Y. State College of Agriculture and Life Sciences (Ithaca)
36. Fordham University (Bronx)
37. Hofstra University (Hempstead)
38. Long Island University (Brooklyn Center) (Brooklyn)
39. New School for Social Research (New York)
40. New York University (New York)
41. Polytechnic Institute of Brooklyn (Brooklyn)
42. Rensselaer Polytechnic Institute (Troy)
43. St. John's University (Jamaica)
44. SUNY State University (Albany)
45. SUNY State University (Binghamton)
46. SUNY State University (Buffalo)
47. SUNY State University (Stony Brook)
48. Syracuse University (Syracuse)
49. Union College (Schenectady)
50. University of Rochester (Rochester)

Pennsylvania

51. Carnegie-Mellon University (Pittsburgh)
52. Drexel University (Philadelphia)
53. Duquesne University (Pittsburgh)
54. Indiana University of Pennsylvania (Indiana)
55. Lehigh University (Bethlehem)
56. Pennsylvania State University (University Park)
57. Temple University (Philadelphia)
58. University of Pennsylvania (Philadelphia)
59. University of Pittsburgh (Pittsburgh)
60. Villanova University (Villanova)

Rhode Island

61. Brown University (Providence)
62. University of Rhode Island (Kingston)

Vermont

63. University of Vermont and State Agricultural College (Burlington)

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*Excludes professional schools (medicine, pharmacy, etc.); schools whose interests appear by inspection to fall entirely outside the sciences; schools of very small enrollment (under 500).

EXHIBIT II-2A

Distribution of Selected Colleges and Universities in the Northeast Offering Doctoral Programs

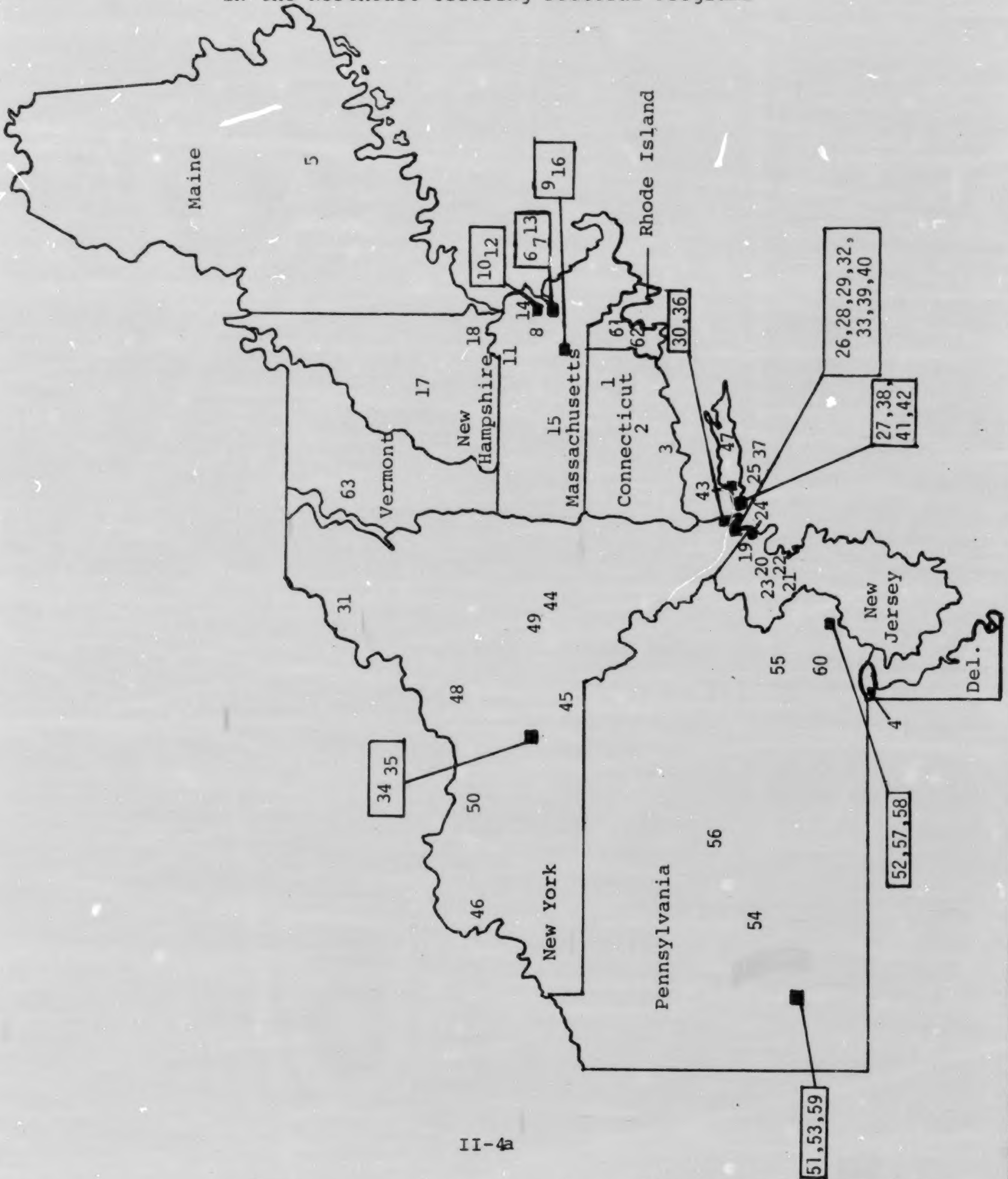
Maine
5
9 16
6 7 13
10 12
14
8
18
11
Rhode Island
30,36
61
62
26,28,29,32, 33,39,40
27,38, 41,42
17
New Hampshire
15
Massachusetts
1
Connecticut
2
3
47
37
25
43
24
63
Vermont
19
20
22
21
23
New Jersey
31
44
49
55
60
Del.
4
48
45
34 35
50
52,57,58
56
New York
46
Pennsylvania
54
51,53,59

EXHIBIT II-3

Federal Obligations for Research and Development to Colleges and Universities in the Northeast, by State and Detailed Field of Science, FY 1972 (Dollars in Thousands)

Connecticut

Total Federal Obligations		35,510
Physical Science	6,743	
Astronomy	197	
Chemistry	2,257	
Physics	4,239	
Physical Science	50	
Mathematics	687	
Environmental Science	1,002	
Atmospheric Sciences	274	
Geological Sciences	97	
Oceanography	546	
Environmental Sciences, Nec*	85	
Engineering	1,669	
Chemical	290	
Civil	25	
Electrical	542	
Mechanical	31	
Metallurgy & Materials	367	
Engineering, Nec	414	
Life Sciences	21,033	
Biological	10,610	
Clinical Medical	5,924	
Other Medical	4,372	
Life Sciences, Nec	127	
Psychology	1,619	
Biological Aspects	815	
Social Aspects	623	
Psychological Sciences, Nec	181	

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* Not elsewhere classified.

Exhibit II-3, cont'd.

Social Sciences	2,069	
Anthropology	79	
Economics	703	
History	86	
Linguistics	14	
Political Science	30	
Sociology	26	
Social Sciences, Nec	1,131	
Other Sciences, Nec	688	
Delaware		2,898
Physical Sciences	497	
Chemistry	199	
Physics	212	
Physical Sciences, Nec	86	
Mathematics	20	
Environmental Sciences	255	
Oceanography	57	
Environmental Sciences, Nec	198	
Engineering	362	
Chemical	60	
Civil	43	
Electrical	24	
Mechanical	47	
Metallurgy & Materials	177	
Engineering, Nec	11	
Life Sciences	921	
Biological	809	
Other Medical	112	
Psychology	23	
Psychological Sciences, Nec	23	
Social Sciences	109	
Social Sciences, Nec	109	
Other Sciences, Nec	711	

Exhibit II-3, cont'd.

Maine		1,737
Physical Sciences	274	
Chemistry	117	
Physics	62	
Physical Sciences, Nec	95	
Environmental Sciences	113	
Atmospheric Sciences	25	
Geological Sciences	34	
Oceanography	46	
Environmental Sciences, Nec	8	
Engineering	253	
Chemical	72	
Civil	27	
Electrical	16	
Engineering, Nec	138	
Life Sciences	825	
Biological	774	
Other Medical	28	
Life Sciences, Nec	23	
Psychology	41	
Biological Aspects	28	
Social Aspects	13	
Social Sciences	231	
Anthropology	23	
Political Science	8	
Sociology	32	
Social Sciences, Nec	168	
Massachusetts		200,456
Physical Sciences	45,752	
Astronomy	9,432	
Chemistry	6,132	
Physics	22,485	
Physical Sciences, Nec	7,703	
Mathematics	4,922	

Exhibit II-3, cont'd.

Environmental Sciences	30,046	
Atmospheric Sciences	3,864	
Geological Sciences	4,879	
Oceanography	15,598	
Environmental Sciences, Nec	5,705	
Engineering	48,595	
Aeronautical	3,373	
Astronautical	6,915	
Chemical	803	
Civil	3,810	
Electrical	20,684	
Mechanical	3,950	
Metallurgy & Materials	6,086	
Engineering, Nec	2,974	
Life Sciences	55,862	
Biological	25,950	
Clinical Medical	18,704	
Other Medical	10,796	
Life Sciences, Nec	412	
Psychology	2,875	
Biological Aspects	1,531	
Social Aspects	944	
Psychological Sciences, Nec	400	
Social Sciences	5,863	
Anthropology	334	
Economics	1,122	
History	102	
Linguistics	374	
Political Science	225	
Sociology	1,706	
Social Sciences, Nec	2,000	
Other Sciences, Nec	6,541	
New Hampshire		6,742
Physical Sciences	1,034	
Astronomy	173	
Chemistry	240	
Physics	511	
Physical Sciences, Nec	110	
Mathematics	168	

Exhibit II-3, cont'd.

Environmental Sciences	1,229	
Atmospheric Sciences	523	
Geological Sciences	49	
Oceanography	524	
Environmental Sciences, Nec	133	
Engineering	34	
Civil	8	
Engineering, Nec	26	
Life Sciences	3,433	
Biological	1,643	
Clinical Medical	303	
Other Medical	1,487	
Psychology	277	
Biological Aspects	53	
Social Aspects	224	
Social Sciences	323	
Economics	3	
Political Science	6	
Social Sciences, Nec	314	
Other Sciences, Nec	244	
New Jersey		25,810
Physical Sciences	9,175	
Astronomy	1,691	
Chemistry	1,726	
Physics	4,797	
Physical Sciences, Nec	961	
Mathematics	926	
Environmental Sciences	935	
Atmospheric Sciences	236	
Geological Sciences	436	
Oceanography	21	
Environmental Sciences, Nec	242	

Exhibit II-3, cont'd.

Engineering	3,378	
Aeronautical	690	
Astronautical	328	
Chemical	654	
Civil	305	
Electrical	168	
Mechanical	834	
Metallurgy & Materials	207	
Engineering, Nec	192	
Life Sciences	7,858	
Biological	6,208	
Clinical Medical	564	
Other Medical	1,067	
Life Sciences, Nec	19	
Psychology	2,152	
Biological Aspects	1,573	
Social Aspects	460	
Psychological Sciences, Nec	119	
Social Sciences	621	
Anthropology	2	
Economics	112	
History	56	
Linguistics	20	
Political Science	51	
Sociology	97	
Social Sciences, Nec	283	
Other Sciences, Nec	765	
New York		209,541
Physical Sciences	33,355	
Astronomy	3,713	
Chemistry	8,108	
Physics	19,814	
Physical Sciences, Nec	1,720	
Mathematics	6,385	
Environmental Sciences	13,282	
Atmospheric Sciences	2,060	
Geological Sciences	4,236	
Oceanography	4,331	
Environmental Sciences, Nec	2,655	

Exhibit II-3, cont'd.

Engineering	15,137	
Aeronautical	684	
Astronautical	70	
Chemical	616	
Civil	867	
Electrical	3,456	
Mechanical	1,664	
Metallurgy & Materials	4,838	
Engineering, Nec	2,942	
Life Sciences	118,110	
Biological	48,357	
Clinical Medical	45,764	
Other Medical	23,676	
Life Sciences, Nec	313	
Psychology	7,002	
Biological Aspects	3,694	
Social Aspects	2,184	
Psychological Sciences, Nec	1,124	
Social Sciences	5,833	
Anthropology	15	
Economics	519	
Linguistics	86	
Political Science	36	
Sociology	1,039	
Social Sciences, Nec	4,138	
Other Sciences, Nec	1,474	
Pennsylvania		87,988
Physical Sciences	10,231	
Astronomy	110	
Chemistry	3,857	
Physics	6,150	
Physical Sciences, Nec	114	
Mathematics	3,969	
Environmental Sciences	3,341	
Atmospheric Sciences	2,058	
Geological Sciences	816	
Oceanography	292	
Environmental Sciences, Nec	175	

Exhibit II-3, cont'd.

Engineering	9,375	
Aeronautical	215	
Astronautical	30	
Chemical	479	
Civil	938	
Electrical	678	
Mechanical	695	
Metallurgy & Materials	4,890	
Engineering, Nec	1,450	
Life Sciences	48,993	
Biological	19,112	
Clinical Medical	21,133	
Other Medical	8,673	
Life Sciences, Nec	75	
Psychology	3,199	
Biological Aspects	2,344	
Social Aspects	629	
Psychological Sciences, Nec	226	
Social Sciences	5,208	
Anthropology	378	
Economics	963	
History	73	
Linguistics	205	
Political Science	190	
Sociology	787	
Social Sciences, Nec	2,612	
Other Sciences, Nec	3,672	
Rhode Island		13,566
Physical Sciences	1,637	
Chemistry	498	
Physics	985	
Physical Sciences, Nec	154	
Mathematics	842	
Environmental Sciences	3,987	
Atmospheric Sciences	197	
Geological Sciences	242	
Oceanography	2,418	
Environmental Sciences, Nec	1,130	

Exhibit II-3, cont'd.

Engineering	2,993	
Aeronautical	57	
Chemical	128	
Civil	108	
Electrical	198	
Mechanical	435	
Metallurgy & Materials	1,735	
Engineering, Nec	332	
Life Sciences	3,260	
Biological	1,755	
Clinical Medical	749	
Other Medical	756	
Psychology	411	
Biological Aspects	237	
Social Aspects	4	
Psychological Sciences, Nec	170	
Social Sciences	235	
Anthropology	8	
Economics	134	
Social Sciences, Nec	93	
Other Sciences, Nec	201	
Vermont		5,040
Physical Sciences	268	
Chemistry	105	
Physics	67	
Physical Sciences, Nec	96	
Mathematics	112	
Environmental Sciences	84	
Geological Sciences	54	
Environmental Sciences, Nec	30	
Engineering	471	
Chemical	24	
Electrical	317	
Engineering, Nec	130	

Exhibit II-3, cont'd.

Life Sciences	3,659
Biological	1,338
Clinical Medical	940
Other Medical	1,380
Life Sciences, Nec	1
Psychology	156
Biological Aspects	113
Social Aspects	43
Social Sciences	204
Economics	17
Linguistics	7
Political Science	34
Social Sciences, Nec	146
Other Sciences, Nec	86

Source - National Science Foundation

EXHIBIT II-4

Federal Obligations for Research and Development to Colleges and Universities Surveyed by CSG, by Detailed Field of Science, FY 1972
(Dollars in Thousands)

Connecticut		
University of Bridgeport		25
Psychology	17	
Biological Aspects	15	
Social Aspects	2	
Social Sciences	8	
Social Sciences, Nec*	8	
Connecticut		
Wesleyan University		751
Physical Science	241	
Astronomy	86	
Chemistry	26	
Physics	129	
Environmental Sciences	10	
Geological Sciences	10	
Life Sciences	448	
Biological	448	
Psychology	14	
Social Aspects	14	
Social Sciences	38	
History	30	
Political Science	8	
Connecticut		
Yale University		27,506
Physical Science	5,704	
Astronomy	111	
Chemistry	1,759	
Physics	3,834	
Mathematics	591	

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* Not elsewhere classified.

Exhibit II-4, cont'd.

Environmental Sciences	823	
Atmospheric Sciences	245	
Geological Sciences	51	
Oceanography	527	
Engineering	963	
Chemical	237	
Civil	19	
Electrical	165	
Mechanical	25	
Metallurgy & Materials	210	
Engineering, Nec	307	
Life Sciences	16,061	
Biological	7,004	
Clinical Medical	5,241	
Other Medical	3,816	
Psychology	1,158	
Biological Aspects	497	
Social Aspects	554	
Psychological Sciences, Nec	107	
Social Sciences	1,697	
Anthropology	75	
Economics	703	
History	56	
Linguistics	8	
Political Science	18	
Social Sciences, Nec.	837	
Other Sciences, Nec	509	
Delaware		
University of Delaware		2,640
Physical Science	497	
Chemistry	199	
Physics	212	
Physical Sciences, Nec	86	
Mathematics	20	

Exhibit II-4, cont'd.

Environmental Sciences	115	
Oceanography	57	
Environmental Sciences, Nec	58	
Engineering	356	
Chemical	60	
Civil	43	
Electrical	24	
Mechanical	47	
Metallurgy & Materials	171	
Engineering, Nec	11	
Life Sciences	809	
Biological	709	
Other Medical	100	
Psychology	23	
Psychological Sciences, Nec	23	
Social Sciences	109	
Social Sciences, Nec	109	
Other Sciences, Nec	711	
Maine		
Colby College		5
Psychology	5	
Biological Aspects	5	
Maine		
University of Maine (Orono)		1,464
Physical Sciences	238	
Chemistry	81	
Physics	62	
Physical Sciences, Nec	95	
Environmental Sciences	100	
Atmospheric Sciences	12	
Geological Sciences	34	
Oceanography	46	
Environmental Sciences, Nec	8	

Exhibit II-4, cont'd.

Engineering	253	
Chemical	72	
Civil	27	
Electrical	16	
Engineering, Nec	138	
Life Sciences	646	
Biological	595	
Other Medical	28	
Life Sciences, Nec	23	
Psychology	34	
Biological Aspects	23	
Social Aspects	11	
Social Sciences	193	
Anthropology	23	
Political Science	8	
Social Sciences, Nec	162	
Massachusetts		
Boston College		2,228
Physical Sciences	393	
Astronomy	36	
Chemistry	164	
Physics	193	
Mathematics	384	
Environmental Sciences	271	
Atmospheric Sciences	271	
Engineering	149	
Electrical	149	
Life Sciences	52	
Biological	52	
Psychology	9	
Social Aspects	9	

Exhibit II-4, cont'd.

Social Sciences	866	
Sociology	411	
Social Sciences, Nec	455	
Other Sciences, Nec	104	
Massachusetts		
Boston University		8,748
Physical Sciences	100	
Chemistry	100	
Mathematics	791	
Environmental Sciences	33	
Atmospheric Sciences	33	
Engineering	346	
Aeronautical	37	
Engineering, Nec	309	
Life Sciences	7,145	
Biological	2,206	
Clinical Medical	2,774	
Other Medical	2,140	
Life Sciences, Nec	25	
Psychology	166	
Biological Aspects	56	
Social Aspects	110	
Social Sciences	147	
Economics	2	
Sociology	123	
Social Sciences, Nec	22	
Other Sciences, Nec	20	

Exhibit II-4, cont'd.

Massachusetts		
Lowell Technological Institute		987
Environmental Sciences	316	
Atmospheric Sciences	274	
Geological Sciences	37	
Oceanography	5	
Engineering	374	
Aeronautical	66	
Civil	70	
Electrical	72	
Mechanical	166	
Life Sciences	65	
Life Sciences, Nec.	65	
Psychology	167	
Biological Aspects	56	
Social Aspects	111	
Other Sciences, Nec.	65	
Massachusetts		
Tufts University		5,535
Physical Sciences	400	
Chemistry	79	
Physics	321	
Mathematics	12	
Engineering	292	
Aeronautical	2	
Chemical	32	
Electrical	197	
Engineering, Nec	61	
Life Sciences	4,625	
Biological	2,630	
Clinical Medical	1,246	
Other Medical	749	

Exhibit II-4, cont'd.

Psychology	165	
Biological Aspects	158	
Social Aspects	7	
Social Sciences	14	
Economics	14	
Other Sciences, Nec	27	
Massachusetts		
University of Massachusetts - Amherst		6,282
Physical Sciences	1,760	
Astronomy	380	
Chemistry	480	
Physics	818	
Physical Sciences, Nec	82	
Mathematics	258	
Environmental Sciences	352	
Atmospheric Sciences	6	
Geological Sciences	278	
Oceanography	39	
Environmental Sciences, Nec	29	
Engineering	868	
Aeronautical	9	
Chemical	102	
Civil	162	
Electrical	213	
Mechanical	213	
Engineering, Nec	169	
Life Sciences	1,873	
Biological	1,600	
Other Medical	158	
Life Sciences, Nec	115	
Psychology	424	
Biological Aspects	110	
Social Aspects	170	
Psychological Sci., Nec	144	

Exhibit II-4, cont'd.

Social Sciences	408	
Anthropology	6	
Economics	52	
Political Science	12	
Sociology	2	
Social Sciences, Nec	336	
Other Sciences, Nec	339	
Massachusetts		
Worcester Polytechnic Institute		469
Physical Sciences	84	
Chemistry	84	
Mathematics	33	
Environmental Sciences	96	
Geological Sciences	40	
Environmental Sci., Nec	56	
Engineering	236	
Chemical	147	
Civil	33	
Engineering, Nec	56	
Other Sciences, Nec	20	
New Hampshire		
Dartmouth College		4,136
Physical Sciences	306	
Chemistry	138	
Physics	168	
Mathematics	154	
Environmental Sciences	347	
Atmospheric Sciences	219	
Environmental Sciences, Nec	128	
Life Sciences	2,672	
Biological	882	
Clinical Medical	303	
Other Medical	1,487	

Exhibit II-4, cont'd.

Psychology	269	
Biological Aspects	46	
Social Aspects	223	
Social Sciences	160	
Social Sciences, Nec	160	
Other Sciences, Nec	228	
New Hampshire		
University of New Hampshire, Durham		2,554
Physical Sciences	728	
Astronomy	173	
Chemistry	102	
Physics	343	
Physical Sciences, Nec	110	
Mathematics	14	
Environmental Sciences	822	
Atmospheric Sciences	244	
Geological Sciences	49	
Oceanography	524	
Environmental Sci., Nec	5	
Engineering	34	
Civil	8	
Engineering, Nec.	26	
Life Sciences	761	
Biological	761	
Psychology	8	
Biological Aspects	7	
Social Aspects	1	
Social Sciences	161	
Economics	3	
Political Science	6	
Social Sciences, Nec	152	
Other Sciences, Nec	16	

Exhibit II-4, cont'd.

New Jersey

Rutgers University		8,506
Physical Sciences	1,174	
Chemistry	423	
Physics	615	
Physical Sciences, Nec	136	
Mathematics	337	
Environmental Sciences	214	
Atmospheric Sciences	121	
Geological Sciences	13	
Environmental Sciences, Nec	80	
Engineering	343	
Civil	69	
Mechanical	39	
Metallurgy & Materials	206	
Engineering, Nec	29	
Life Sciences	4,093	
Biological	3,581	
Clinical Medical	31	
Other Medical	462	
Life Sciences, Nec	19	
Psychology	1,581	
Biological Aspects	1,164	
Social Aspects	355	
Psychological Sciences, Nec	62	
Social Sciences	367	
History	13	
Linguistics	20	
Political Science	49	
Sociology	81	
Social Sciences, Nec	204	
Other Sciences, Nec	397	

New Jersey

Glassboro State College - Data not Available

New York

Colgate University - Data not Available

Exhibit II-4, cont'd.

New York

Columbia University		45,493
Physical Sciences	11,323	
Astronomy	2,107	
Chemistry	1,420	
Physics	6,955	
Physical Sciences, Nec	841	
Mathematics	540	
Environmental Sciences	7,749	
Atmospheric Sciences	578	
Geological Sciences	2,878	
Oceanography	3,851	
Environmental Sciences, Nec	442	
Engineering	828	
Aeronautical	10	
Chemical	125	
Civil	134	
Electrical	322	
Mechanical	43	
Metallurgy & Materials	25	
Engineering, Nec	169	
Life Sciences	19,852	
Biological	5,972	
Clinical Medical	11,410	
Other Medical	2,470	
Psychology	876	
Biological Aspects	614	
Social Aspects	218	
Psychological Sciences, Nec	44	
Social Sciences	4,099	
Anthropology	325	
Economics	539	
Linguistics	22	
Political Science	26	
Sociology	1,304	
Social Sciences, Nec	1,883	
Other Sciences, Nec	226	

Exhibit II-4, cont'd.

New York

Cornell University		31,034
Physical Sciences	6,935	
Astronomy	250	
Chemistry	905	
Physics	5,375	
Physical Sciences, Nec	405	
Mathematics	1,058	
Environmental Sciences	1,156	
Atmospheric Sciences	203	
Geological Sciences	669	
Environmental Sciences, Nec	284	
Engineering	5,421	
Aeronautical	143	
Astronautical	70	
Chemical	16	
Civil	263	
Electrical	657	
Mechanical	266	
Metallurgy & Materials	3,410	
Engineering, Nec	596	
Life Sciences	13,580	
Biological	8,358	
Clinical Medical	2,122	
Other Medical	3,066	
Life Sciences, Nec	34	
Psychology	565	
Biological Aspects	186	
Social Aspects	319	
Psychological Sciences, Nec	60	
Social Sciences	1,327	
Anthropology	38	
Economics	327	
History	25	
Linguistics	73	
Sociology	237	
Social Sciences, Nec	627	
Other Sciences, Nec	992	

Exhibit II-4, cont'd.

New York		
CUNY Graduate School & University Center		312
Mathematics	69	
Life Sciences	125	
Clinical Medical	95	
Other Medical	30	
Psychology	102	
Social Aspects	2	
Psychological Sciences, Nec	100	
Social Sciences	16	
Linguistics	7	
Sociology	9	
New York		
Fordham University		383
Physical Sciences	101	
Chemistry	76	
Physics	25	
Mathematics	11	
Engineering	27	
Engineering, Nec	27	
Life Sciences	145	
Biological	90	
Life Sciences, Nec	55	
Psychology	99	
Psychological Sciences, Nec	99	
New York		
Rensselaer Polytechnic Institute		3,206
Physical Sciences	614	
Chemistry	366	
Physics	248	
Mathematics	102	

Exhibit II-4, cont'd.

Environmental Sciences	160	
Atmospheric Sciences	150	
Oceanography	10	
Engineering	1,944	
Aeronautical	49	
Chemical	109	
Civil	16	
Electrical	152	
Mechanical	214	
Metallurgy & Materials	597	
Engineering, Nec	807	
Life Sciences	341	
Biological	277	
Clinical Medical	38	
Other Medical	26	
Other Sciences, Nec	45	
New York		
Rochester Institute of Technology		189
Physical Sciences	164	
Chemistry	164	
Engineering	25	
Electrical	25	
New York		
SUNY College - Buffalo		477
Physical Sciences	3	
Chemistry	3	
Mathematics	77	
Engineering	45	
Aeronautical	15	
Mechanical	30	
Life Sciences	252	
Biological	26	
Other Medical	226	

Exhibit II-4, cont'd.

Psychology	4	
Social Aspects	4	
Social Sciences	96	
Sociology	56	
Social Sciences, Nec	40	
New York		
University of Rochester		18,371
Physical Sciences	3,352	
Astronomy	28	
Chemistry	494	
Physics	2,830	
Mathematics	253	
Environmental Sciences	564	
Atmospheric Sciences	12	
Geological Sciences	22	
Oceanography	87	
Environmental Sciences, Nec	443	
Engineering	348	
Aeronautical	13	
Civil	27	
Electrical	34	
Mechanical	220	
Engineering, Nec	54	
Life Sciences	11,819	
Biological	5,301	
Clinical Medical	4,038	
Other Medical	2,480	
Psychology	631	
Biological Aspects	186	
Social Aspects	365	
Psychological Sci., Nec	80	

Exhibit II-4, cont'd.

Social Sciences	679	
Anthropology	6	
Economics	320	
History	19	
Linguistics	31	
Sociology	227	
Social Sciences, Nec	76	
Other Sciences, Nec	725	
New York		
SUNY College - Plattsburgh		12
Life Sciences	12	
Biological	12	
New York		
Syracuse University		4,415
Physical Sciences	717	
Chemistry	120	
Physics	597	
Mathematics	61	
Environmental Sciences	46	
Geological Sciences	46	
Engineering	1,725	
Chemical	107	
Civil	84	
Electrical	854	
Mechanical	68	
Metallurgy & Materials	470	
Engineering, Nec	142	
Life Sciences	871	
Biological	559	
Clinical Medical	98	
Other Medical	214	

Exhibit II-4, cont'd.

Psychology	264	
Biological Aspects	104	
Social Aspects	66	
Psychological Sci., Nec	94	
Social Sciences	697	
Political Science	55	
Social Sciences, Nec	642	
Other Sciences, Nec	34	
Pennsylvania		
Carnegie-Mellon University		8,469
Physical Sciences	2,264	
Chemistry	918	
Physics	1,346	
Mathematics	2,712	
Engineering	1,533	
Astronautical	30	
Chemical	177	
Civil	287	
Electrical	129	
Mechanical	153	
Metallurgy & Materials	502	
Engineering, Nec	255	
Life Sciences	720	
Biological	554	
Other Medical	166	
Psychology	547	
Biological Aspects	448	
Social Aspects	99	
Social Sciences	468	
Economics	209	
Political Science	79	
Sociology	93	
Social Sciences, Nec	87	
Other Sciences, Nec	225	

Exhibit II-4, cont'd.

Pennsylvania		
Drexel University		1,715
Physical Sciences	312	
Chemistry	125	
Physics	187	
Mathematics	82	
Environmental Sciences	55	
Atmospheric Sciences	50	
Oceanography	5	
Engineering	982	
Electrical	57	
Mechanical	47	
Metallurgy & Materials	372	
Engineering, Nec	506	
Life Sciences	145	
Biological	75	
Other Medical	37	
Life Sciences, Nec	33	
Psychology	7	
Social Aspects	7	
Social Sciences	22	
Social Sciences, Nec	22	
Other Sciences, Nec	110	
Pennsylvania		
Franklin and Marshall College		214
Mathematics	150	
Environmental Sciences	36	
Geological Sciences	36	
Life Sciences	28	
Other Medical	28	

Exhibit II-4, cont'd.

Pennsylvania

Pennsylvania State University		15,989
Physical Sciences	1,487	
Chemistry	787	
Physics	586	
Physical Sciences, Nec	114	
Mathematics	133	
Environmental Sciences	1,634	
Atmospheric Sciences	1,100	
Geological Sciences	370	
Oceanography	105	
Environmental Sci., Nec	59	
Engineering	2,184	
Aeronautical	215	
Chemical	91	
Civil	150	
Electrical	364	
Mechanical	240	
Metallurgy & Materials	900	
Engineering, Nec	224	
Life Sciences	8,280	
Biological	4,538	
Clinical Medical	2,542	
Other Medical	1,158	
Life Sciences, Nec	42	
Psychology	432	
Biological Aspects	253	
Social Aspects	118	
Psychological Sci., Nec	61	
Social Sciences	1,642	
Anthropology	25	
Economics	312	
History	6	
Sociology	41	
Social Sciences, Nec	1,258	
Other Sciences, Nec	197	

Exhibit II-4, cont'd.

Pennsylvania		
Temple University		9,419
Physical Sciences	480	
Astronomy	14	
Chemistry	112	
Physics	354	
Mathematics	21	
Engineering	8	
Engineering, Nec	8	
Life Sciences	8,280	
Biological	1,738	
Clinical Medical	4,992	
Other Medical	1,550	
Psychology	370	
Biological Aspects	253	
Social Aspects	117	
Social Sciences	260	
Economics	72	
Social Sciences, Nec	188	
Pennsylvania		
University of Pennsylvania		28,379
Physical Sciences	2,832	
Chemistry	734	
Physics	2,098	
Mathematics	641	
Environmental Sciences	118	
Atmospheric Sciences	25	
Geological Sciences	46	
Environmental Sci., Nec	47	

Exhibit II-4, cont'd.

Engineering	3,180	
Chemical	149	
Civil	104	
Electrical	12	
Mechanical	165	
Metallurgy & Materials	2,381	
Engineering, Nec	369	
Life Sciences	17,469	
Biological	5,854	
Clinical Medical	8,564	
Other Medical	3,051	
Psychology	1,090	
Biological Aspects	857	
Social Aspects	183	
Psychological Sci., Nec	50	
Social Sciences	1,965	
Anthropology	305	
Economics	322	
History	47	
Linguistics	178	
Sociology	280	
Social Sciences, Nec	833	
Other Sciences, Nec	1,084	
Pennsylvania		
Villanova University		92
Engineering	20	
Engineering, Nec	20	
Life Sciences	24	
Biological	24	
Psychology	35	
Biological Aspects	35	
Social Sciences	13	
Social Sciences, Nec	13	

Exhibit II-4, cont'd.

Rhode Island

Brown University		8,197
Physical Sciences	1,379	
Chemistry	376	
Physics	881	
Physical Sciences, Nec	122	
Mathematics	842	
Environmental Sciences	487	
Atmospheric Sciences	137	
Geological Sciences	203	
Oceanography	147	
Engineering	2,681	
Aeronautical	37	
Chemical	83	
Civil	77	
Electrical	154	
Mechanical	435	
Metallurgy & Materials	1,644	
Engineering, Nec	251	
Life Sciences	2,267	
Biological	950	
Clinical Medical	731	
Other Medical	586	
Psychology	392	
Biological Aspects	222	
Psychological Sci., Nec	170	
Social Sciences	139	
Anthropology	8	
Economics	130	
Social Sciences, Nec	1	
Other Sciences, Nec	10	

Exhibit II-4, cont'd.

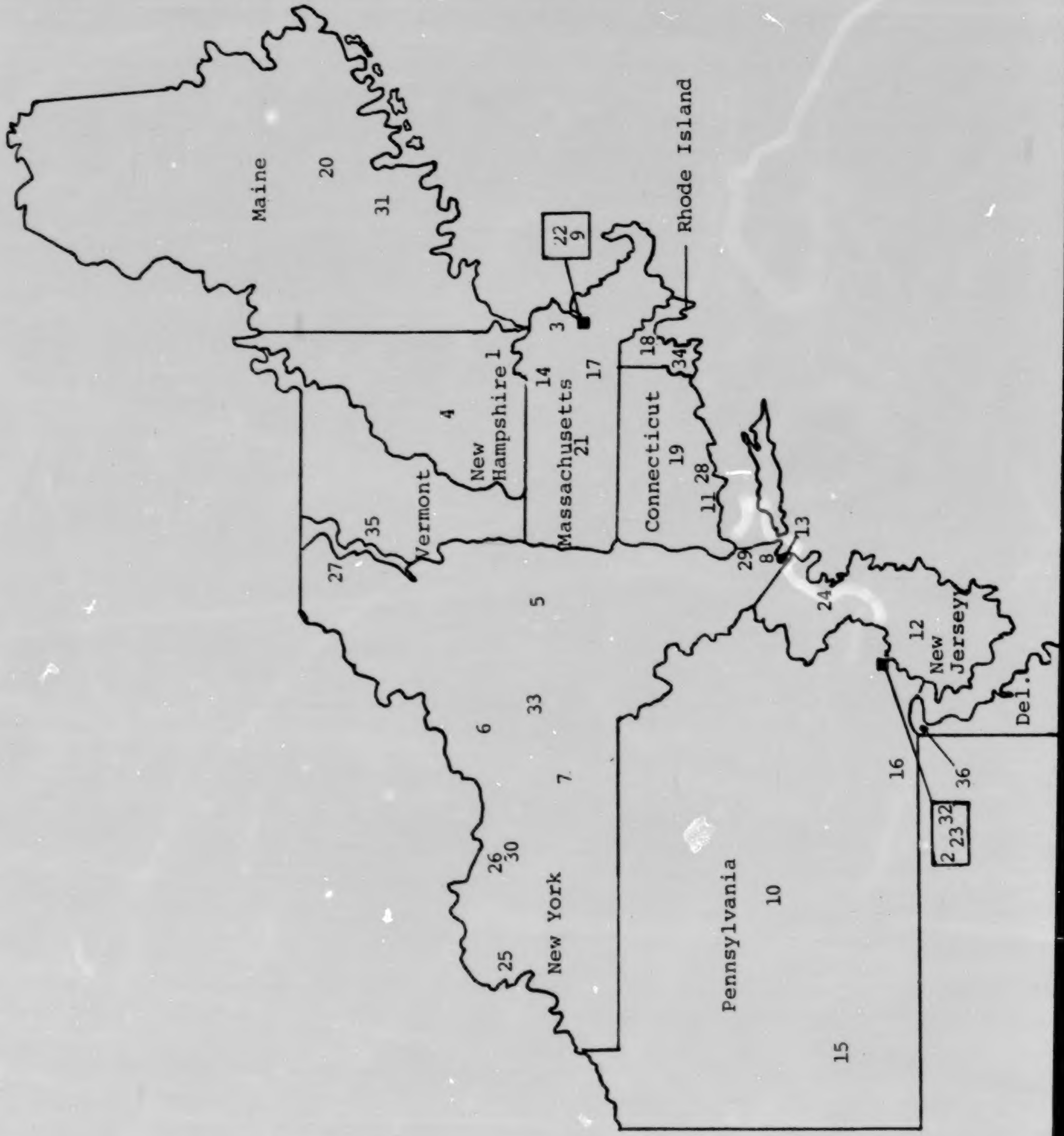
Vermont

University of Vermont		4,901
Physical Sciences	268	
Chemistry	105	
Physics	67	
Physical Sciences, Nec	96	
Mathematics	112	
Environmental Sciences	84	
Geological Sciences	54	
Environmental Sci., Nec	30	
Engineering	447	
Electrical	317	
Engineering, Nec	130	
Life Sciences	3,585	
Biological	1,267	
Clinical Medical	940	
Other Medical	1,377	
Life Sciences, Nec	1	
Psychology	154	
Biological Aspects	113	
Social Aspects	41	
Social Sciences	165	
Economics	17	
Linguistics	7	
Social Sciences, Nec	141	
Other Sciences, Nec	86	

Source - National Science Foundation

EXHIBIT II-5

Distribution of Colleges and Universities Surveyed by CSG


Maine
20
31
22
9
3
Rhode Island
New Hampshire
1
4
14
17
18
34
Massachusetts
21
Connecticut
19
28
11
13
Vermont
35
27
29
8
5
24
12
New Jersey
Del.
16
36
32
2
23
33
6
7
26
30
New York
25
Pennsylvania
10
15

KEY TO EXHIBIT II-5

1. University of New Hampshire, Durham, N.H.
2. University of Pennsylvania, Philadelphia, Pa.
3. Tufts University, Medford, Mass.
4. Dartmouth College, Hanover, N.H.
5. Rensselaer Polytechnic Institute, Troy, N.Y.
6. Syracuse University, Syracuse, N.Y.
7. Cornell University, Ithaca, N.Y.
8. Columbia University, New York, N.Y.
9. Boston University, Boston, Mass.
10. Pennsylvania State University, State College, Pa.
11. University of Bridgeport, Bridgeport, Conn.
12. Glassboro State College, Glassboro, N.J.
13. CUNY Graduate Division, New York, N.Y.
14. Lowell Technological Institute, Lowell, Mass.
15. Carnegie-Mellon University, Pittsburgh, Pa.
16. Franklin and Marshall, Lancaster, Pa.
17. Worcester Polytechnic Institute, Worcester, Mass.
18. Brown University, Providence, R.I.
19. Wesleyan University, Middletown, Conn.
20. University of Maine, Orono, Me.
21. University of Massachusetts, Amherst, Mass.
22. Boston College, Boston, Mass.
23. Drexel University, Philadelphia, Pa.
24. Rutgers University, New Brunswick, N.J.
25. SUNY-Buffalo, Buffalo, N.Y.
26. University of Rochester, Rochester, N.Y.
27. SUNY-Plattsburgh, Plattsburgh, N.Y.
28. Yale University, New Haven, Conn.
29. Fordham University, Bronx, N.Y.
30. Rochester Institute of Technology, Rochester, N.Y.
31. Colby College, Waterville, Me.
32. Temple University, Philadelphia, Pa.
33. Colgate University, Hamilton, N.Y.
34. University of Rhode Island, Kingston, R.I.
35. University of Vermont, Burlington, Vt.
36. University of Delaware, Newark, Del.

EXHIBIT II-6

Colleges and Universities in the Northeast Receiving Largest Amounts of Federal Funds, by Type of Activity

FY 1972 (Dollars in Thousands)

Rank*	Institution	Total-all Activities	Total-Academic Science	R & D	General Support for Science	Other Science	Non-Science
1	Mass. Inst. of Tech.	112,472	111,551	104,882	1,212	559	921
4	Harvard Univ.	65,072	58,625	45,450	919	332	6,447
9	Columbia Univ.	60,654	55,007	45,493	854	436	5,647
15	Cornell Univ.	45,868	43,161	31,034	1,219	5,836	2,707
16	Univ. of Penn.	44,875	37,897	28,379	862	216	6,978
17	Yale Univ.	44,504	37,846	27,506	654	460	6,658
18	New York Univ.	44,093	34,394	23,045	2,162	304	9,699
28	Yeshiva Univ.	29,950	24,443	19,068	464	112	5,507

EXHIBIT II-6, Continued

Rank*	Institution	Total-all Activities	Total-Academic Science	R & D	General Support for Science	Other Science	Non-Science
29	Univ. of Pittsburgh	29,701	19,201	13,197	1,368	696	10,500
30	Penn. State Univ.	28,831	24,621	15,989	422	6,119	4,210
35	Univ. of Rochester	27,531	23,297	18,371	462	153	4,234
49	Boston Univ.	20,478	13,585	8,748	417	1	6,893
50	Rutgers Univ.	20,072	12,798	8,506	375	1,805	7,274
52	Temple Univ.	19,829	12,344	9,419	441	218	7,485
53	Woods Hole Ocean. Inst.	19,527	19,527	16,372	106	0	0
55	Princeton Univ.	18,438	17,180	14,456	929	100	1,258
62	Suny St. U. Buffalo	16,844	11,200	8,208	517	251	5,644
72	Univ. of Conn.	14,323	9,887	6,455	389	1,199	4,436

EXHIBIT II-6, Continued

Rank*	Institution	Total-All Activities	Total-Academic Science	R & D	General Support for Science	Other Science	Non-Science
79	Tufts Univ.	12,905	7,233	5,535	324	214	5,672
96	Rockefeller Univ.	10,769	10,769	9,203	176	108	0

*Refers to rank order among the 100 colleges and universities in the U.S. receiving largest amounts of Federal support.

Source - National Science Foundation

III. PROFILE OF THE POTENTIAL STATE AND LOCAL GOVERNMENT MARKET

A. General Characteristics

The extent to which the 10 Northeastern states offer a potential census-related data market to NASIC is related to several area characterisitcs, which include population, distribution of the population, public-sector spending, and the general "sophistication" of the many governmental units within the area.

In the aggregate, there is no question about the potential of the Northeast market. The 10-state region has about 50 million residents, nearly 25 percent of the total national population. On the reasonable, but untested, assumption that there is a relationship between total population, distributions and densities of population, and a general governmental need to engage in greater physical and human resources planning, this region also could be expected to be generally advanced in such planning.

As a whole, this area is highly metropolitanized with 7 of the 10 states having metropolitan populations exceeding the national average of 68.6 percent. The metropolitanization of these 7 states ranges from 70.4 percent in Delaware to 86.5 percent in New York State. At the same time, it should be noted that three of the regional states--Maine, New Hampshire, and Vermont--are much more rural, having metropolitan populations of only 21.6, 27.3 and 0 percent respectively. The region has 26 of the 100 largest Standard Metropolitan Statistical Areas in the nation. Viewing this more finely, there are 20 cities in the region with 100,000 or more persons. None of these is in Maine, New Hampshire, Vermont, or Delaware.

While these aggregated figures are suggestive of the broad contours of the market potential, NASIC's concern is with the market of individual state and local governments. The following table provides a count of the universe of the local government market.

EXHIBIT III-1

Units of Local Government in the
10-State Region of Northeast U.S.

State	Counties	Municipalities	Townships
Maine	16	21	469
Vermont	14	65	238
New Hampshire	10	13	222
Massachusetts	12	39	312
Connecticut	--	34	149
Rhode Island	--	8	31
New York	57	616	931
New Jersey	21	335	232
Pennsylvania	66	1,005	1,554
Delaware	3	52	--
	229	2,178	4,138

However, this total of 6,545 units of local government is not a realistic estimate of the number of potential clients since a great percentage of these units, such as many of the counties and townships, perform few governmental functions. Others are very small communities with little population and very limited locally-raised resources. A more meaningful figure for initial estimates would be the 700-plus communities with populations of 10,000 or more. The largest number of communities in this category are found in Pennsylvania, New Jersey, Massachusetts, and New York. Within the region there are a few counties that have significant public-sector programs and a few regional Councils of Government. In all, there are approximately 750 units of state, local and regional government that would compose a universe for potential NASIC services. However, as will be subsequently brought out in the report, even this number must be greatly reduced for a realistic estimate of the state and local market.

B. Public Expenditures

Another characteristic that may offer insight into the potential market of the region is the level of state and local expenditures (Exhibit III-2). It is suggested here that the level of public sector expenditures within a state is related to the political and bureaucratic culture of the state and to the resource base of the state, both being factors that may influence interest in and perceptions of computerized information services.

Related to the expenditure pattern is the level of public employment at the state and local levels (Exhibit III-3). Again, the untested assumption is that size explains something and, in this case, the size of the bureaucratic establishment is related in some way to bureaucratic expertise and sophistication of administrative management techniques.

EXHIBIT III-2

State and Local Expenditures, Northeast United States, 1970

	Total General Expenditures (millions)	Per Capita	State Only Expenditures (millions)
Maine	548	552	433
N.H.	396	537	273
Vermont	322	724	289
Mass.	3,914	688	2,448
Conn.	2,057	678	1,348
R.I.	587	618	445
New York	16,770	919	9,894
New Jersey	4,330	604	2,540
Penn.	7,044	597	5,114
Delaware	433	790	326

EXHIBIT III-3

State and Local Employment Northeast United States, 1970 (in thousands)

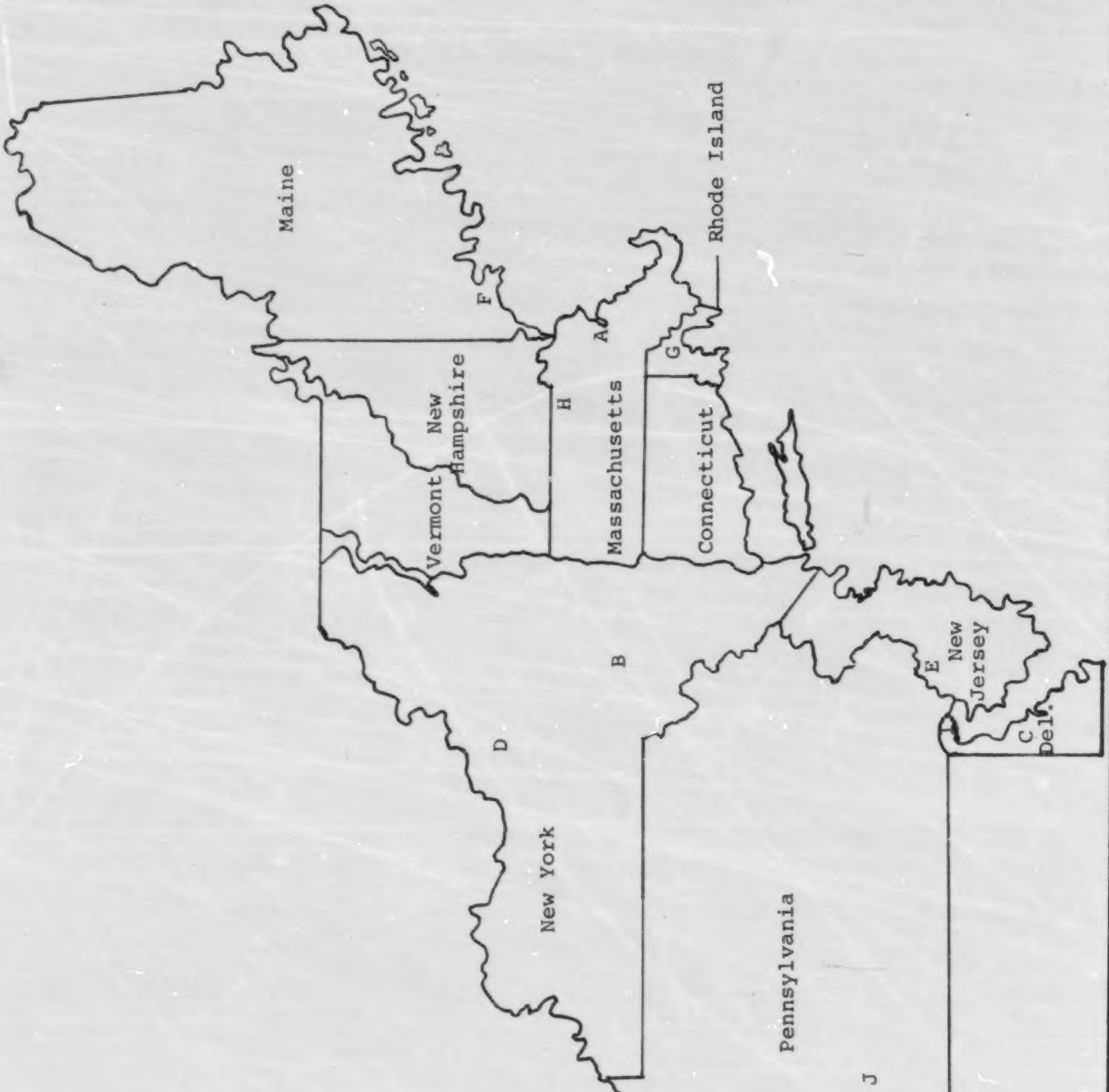
	State	Local	Payroll (mil.)
Maine	15	26	$ 24
N.H.	10	18	18
Vermont	10	10	13
Mass.	64	172	181
Conn.	39	78	94
R.I.	15	22	26
New York	184	761	810
New Jersey	62	217	221
Penn.	122	301	299
Delaware	12	15	18

Frequently, aggregate data obscures as much as it reveals, and that is the case here. The data on expenditures and employment do not reveal, for example, the distribution of governmental functions between state and local governments. In some states, the state government may perform functions that in other states are carried out by local governments. Also, within a particular level of government, expenditures should be differentiated between functional areas such as education, social welfare, highways, and general government. Since the need for data bases, census-related or bibliographic, is related generally to specific functional planning, the distribution of such functions among levels of government and the nature of the planning activity is very important in determining the market for computerized information systems.

In summary, it is suggested that the potential use of computerized census data and other data systems by state and local governments is the product of a complex matrix relating such variables as urbanization, public-sector spending, planning penetration, bureaucratic structure, and bureaucratic culture or management technique. Any effort to precisely calculate the number of potential data-base users should consider these factors.

EXHIBIT III-4

Distribution of State and Local Governments Surveyed by CSC


Maine
F
Rhode Island
A
G
New Hampshire
H
Massachusetts
Connecticut
Vermont
B
New Jersey
E
C
Del.
D
New York
Pennsylvania
J

KEY TO EXHIBIT III-4

Government Units

State Governments

A. Boston, Mass.
B. Albany, N.Y.
C. Dover, Del.

Municipal Governments

D. Syracuse, N.Y.
E. Camden, N.J.
F. Portland, Me.
G. Providence, R.I.
H. Fitchburg, Mass.
I. Wilmington, Del.
J. Pittsburgh, Pa.

IV. PROFILE OF THE POTENTIAL NON-PROFIT INSTITUTION MARKET

No exact count is available of the number of non-profit research institutions in the Northeast. The number, however, is apparently quite small; it is undoubtedly small when restrictions of size are applied. CSG was able to identify only 32 such institutions that reported research activities totalling over $1 million per year (these are listed in Exhibit IV-1).

By inspection, it is clear that most of the non-profit research institutions in the Northeast are concerned with the life sciences, and even more specifically, with biomedical research. This finding is reinforced by the information in Exhibit IV-2, which displays federal obligations to non-profit research institutions, and identifies the funding agencies.

The significance of the small size of the non-profit market, and its heavy bias toward biomedical research, will be treated in Chapter VII.

EXHIBIT IV-1

Non-Profit Research Institutions Reporting Annual Research Activity of More than $1 Million

American Iron and Steel Institute (New York, New York)
American Museum of Natural History (New York, New York)
American Petroleum Institute (New York, New York)
American Society for Testing and Materials (Philadelphia, Pa.)
Boston Biomedical Research Institute (Boston, Massachusetts)
Boyce Thompson Institute for Plant Research (Yonkers, New York)
Brookhaven National Laboratory (Long Island, New York)
Carnegie Endowment for International Peace (New York, New York)
Community Development Foundation (New York, New York)
Forsyth Dental Center (Boston, Massachusetts)
Franklin Institute of the State of Pennsylvania (Philadelphia, Pa.)
Institute for Advanced Study (Princeton, New Jersey)
Health Research, Inc. (Albany, New York)
Hudson Institute (Croton-on-Hudson, New York)
Institute for Muscle Disease (New York, New York)
Jackson Laboratory (Bar Harbor, Maine)
Lahey Clinic Foundation (Boston, Massachusetts)
Marine Biological Laboratory (Woods Hole, Massachusetts)
Mitre Corporation (Bedford, Massachusetts)
Mt. Desert Island Biological Laboratory (Salisbury Cove, Maine)
National Bureau of Economic Research (New York, New York)
National Industrial Conference Board (New York, New York)
New York City-Rand Institute (New York, New York)
Postgraduate Center for Mental Health (New York, New York)
Public Health Research Institute of the City of New York (N.Y., N.Y.)
Riverside Research Institute (New York, New York)
Retina Foundation (Boston, Massachusetts)
Roswell Park Memorial Institute (Buffalo, New York)
Sloan-Kettering Institute for Cancer Research (New York, New York)
Wistar Institute of Anatomy and Biology (Philadelphia, Pennsylvania)
Woods Hole Oceanographic Institution (Woods Hole, Massachusetts)
Worcester Foundation for Experimental Biology (Shrewsbury, Mass.)

EXHIBIT IV-2

Federal Obligations for Research and Development to Independent Research Institutions in the Northeast, by State, Institution, and Agency, FY 1972*

(Dollars in Thousands)

State and Institution	Total	Dept. of Agriculture	Atomic Energy Commission	Dept. of Commerce	Dept. of Defense	Dept. of Health, Education, & Welfare	Dept. of Interior	National Aeronautics and Space Admin.	National Science Foundation	Other
United States, total.......	$228,194	$351	$5,289	$765	$96,965	$85,136	$12,668	$7,470	$6,803	$12,747
Northeastern U.S., total...	83,472	33	785	537	34,395	33,064	7,377	687	3,205	3,389
Connecticut, total.........	1,452				75	994			223	160
Center for the Environment and Man Inc..............	277								128	149
Haskins Laboratories, Inc..	716				75	535			95	11
John B. Pierce Foundation of Conn., Inc............	459					459				
Maine, total...............	2,027		114			1,860			53	
Jackson Laboratory.........	2,027		114			1,860			53	
Massachusetts, total.......	9,460		50		162	8,920			328	
Blood Research Institute, Inc....................	119				30	89				
Boston Biomedical Research Institute................	1,218					1,112			106	
Children's Cancer Research Foundation...............	2,591				112	2,404			75	
Education Development Center...................	452					452				
Forsyth Dental Center......	1,694					1,694				
Marine Biological Lab......	56					22			34	
Retina Foundation..........	809				20	744			45	
Worcester Foundation for Experimental Biology	2,521		50			2,403			68	

EXHIBIT IV-2 (Continued)

Federal Obligations for Research and Development to Independent Research Institutions in the Northeast, by State, Institution, and Agency, FY 1972*

(Dollars in Thousands)

State and Institution	Total	Dept. of Agriculture	Atomic Energy Commission	Dept. of Commerce	Dept. of Defense	Dept. of Health, Education, & Welfare	Dept. of Interior	National Aeronautics and Space Admin.	National Science Foundation	Other
New Jersey, total..........	$ 2,772	$	$ 86	$	$ 36	$ 2,650	$	$	$	$
Institute for Advanced Study....................	122		86		36					
Institute for Medical Research.................	1,123					1,123				
Merck Institute for Therapeutic Research..........	1,527					1,527				
New York, total............	46,406	33	500	237	30,039	11,107		670	1,841	1,979
Boyce Thompson for Plant Research.................	635	33			53	222			203	124
Cold Spring Harbor Lab. of Quantitative Biology.....	1,498					1,414			84	
Cornell Aeronautical Laboratory...............	21,566			38	19,209			670	37	1,612
Hudson Institute, Inc......	437			50	312					75
Institute for Medical Research & Studies.......	57					57				
Institute for Muscle Disease, Inc............	278					278				
National Bureau of Economic Research........	1,484					186			1,135	163
Public Health Research Institute of New York....	2,058				49	1,740			269	
Riverside Research Institute...............	7,424			149	7,149	126				
Sloan-Kettering Institute for Cancer Research......	6,973		500			6,406			67	

EXHIBIT IV-2 (Continued)

Federal Obligations for Research and Development to Independent Research Institutions in the Northeast, by State, Institution, and Agency, FY 1972*

(Dollars in Thousands)

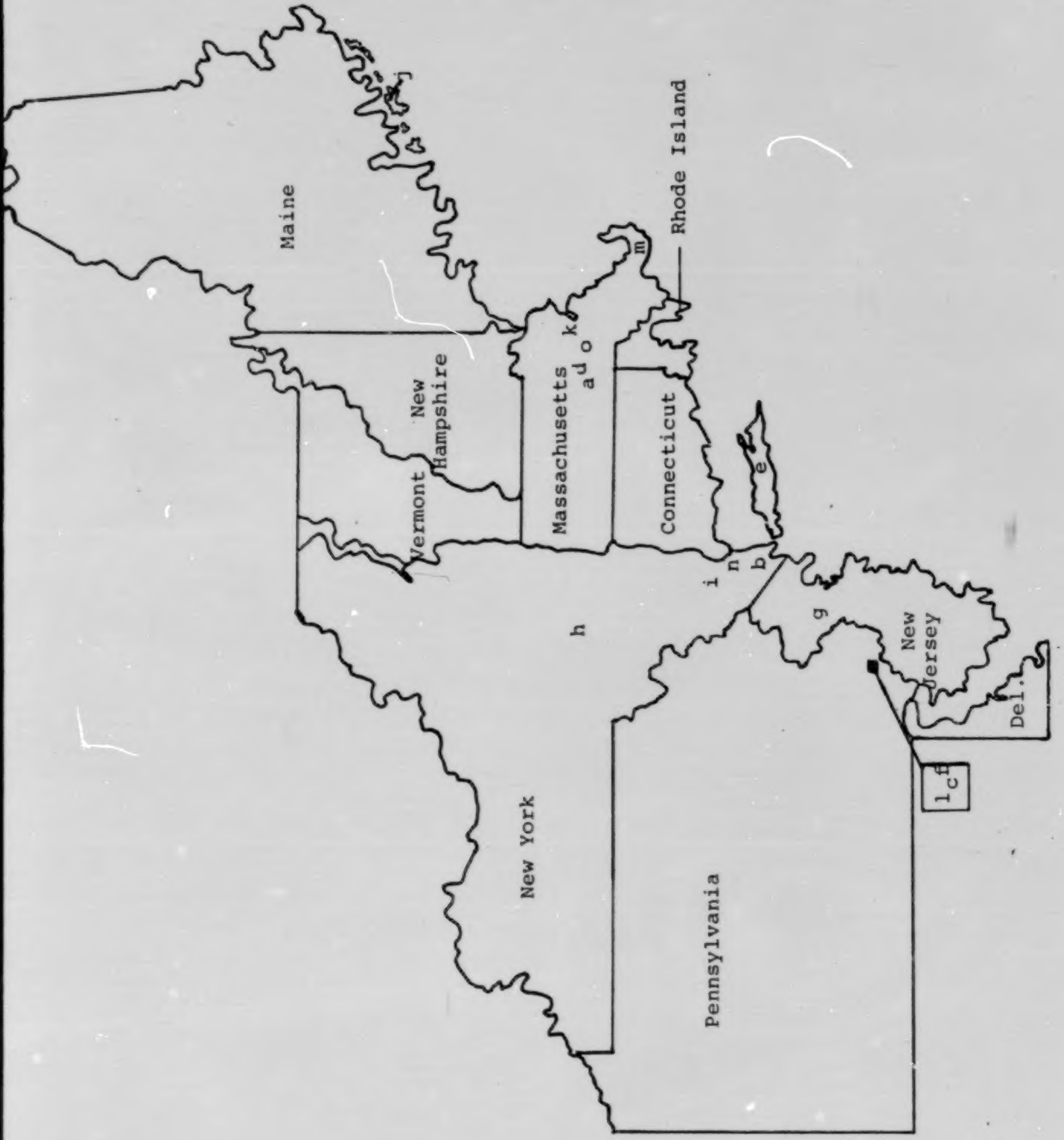
State and Institution	Total	Dept. of Agriculture	Atomic Energy Commission	Dept. of Commerce	Dept. of Defense	Dept. of Health, Education, and Welfare	Dept. of Interior	National Aeronautics and Space Admin.	National Science Foundation	Other
Syracuse University Research Corp..............	$ 3,270	$	$	$	$ 3,204	$ 61	$	$	$	$ 5
Trudeau Institute, Inc.....	726				63	617			46	
Pennsylvania, total........	21,355		35	300	4,083	7,533	7,377	17	760	1,250
American Institute for Research in Behavioral Sciences................	3,157				2,555	577				25
Bituminous Coal Research Institute, Inc...........	7,377						7,377			
Franklin Institute.........	3,581		14	300	970	732		17	323	1,225
Germantown Laboratories, Inc......................	558				558					
Institute for Cancer Research.................	4,466		21			4,008			437	
Wistar Institute...........	2,216					2,216				

*Delaware, New Hampshire, Rhode Island, and Vermont do not appear because there was no significant federal support to institutions in these states.

Source - National Science Foundation

EXHIBIT IV-3

Distribution of the Non-Profit Institutions Surveyed by CSG


Maine
j
Rhode Island
m
New Hampshire
Massachusetts
k
o
d
a
Connecticut
e
Vermont
i
n
b
h
g
New Jersey
Del.
l
c
f
New York
Pennsylvania

KEY TO EXHIBIT IV-3

Non-Profit Institutions

a. Worcester Foundation for Experimental Biology, Shrewsbury, Mass.
b. Riverside Research Institute, New York, N.Y.
c. University City Science Center, Philadelphia, Pa.
d. Worcester Area Chamber of Commerce, Worcester, Mass.
e. Brookhaven National Laboratory, Upton, N.Y.
f. American Society for Testing and Materials, Philadelphia, Pa.
g. Institute for Advanced Study, Princeton, N.J.
h. Health Research, Inc., Albany, N.Y.
i. Hudson Institute, Croton-on-Hudson, N.Y.
j. Jackson Laboratory, Bar Harbor, Me.
k. Lahey Clinic Foundation, Boston, Mass.
l. Wistar Institute of Anatomy and Biology, Philadelphia, Pa.
m. Marine Biological Laboratory, Woods Hole, Mass.
n. Boyce Thompson Institute for Plant Research, Yonkers, N.Y.
o. New England Board of Higher Education, Wellesley, Mass.

V. PROFILE OF THE COMMERCIAL AND INDUSTRIAL MARKET

Within the commercial and industrial market, census database services would appear to have two major uses, namely:

1. For market research for consumer products and services.
2. For site location of retail establishments.

Hence, the types of organizations most likely to constitute a potential market for the census data base would be:

1. Large manufacturers of consumer products whose headquarters are in the Northeast region.
2. Retail organizations with extensive branch facilities such as banks, department stores, gasoline retailers, fast-food chains, drug store chains and supermarket chains.

There are about 1,900 manufacturers headquartered in the 10 Northeastern states, with sales of more than $10 million per year. Most of these organizations are to be found in New York and Pennsylvania (together, 60% of the total). The distribution of these organizations by state is shown in Exhibit V-1.

There are an estimated 1,260 retail organizations in the 10-state region with sales in excess of $5 million per year. Most of these organizations are also in New York and Pennsylvania. The distribution of these organizations throughout the 10-state region is similar to that of manufacturers (New York and Pennsylvania account for about 60% of the total); this is shown in Exhibit V-2. In addition, there are 1,784 banks in the region, distributed by state as shown in Exhibit V-3.

EXHIBIT V-1

Manufacturing Organizations in the Northeast With Annual Sales in Excess of $10 Million

Maine	29
Vermont	5
New Hampshire	27
Massachusetts	251
Connecticut	134
Rhode Island	36
New York	753
New Jersey	256
Pennsylvania	402
Delaware	15
Total	1,908

Source - Dun & Bradstreet

EXHIBIT V-2

Retail Organizations in the Northeast With Annual Sales in Excess of $5 Million

Maine	16
Vermont	1
New Hampshire	11
Massachusetts	192
Connecticut	63
Rhode Island	21
New York	474
New Jersey	208
Pennsylvania	257
Delaware	17
Total	1,260

Source - Dun & Bradstreet

EXHIBIT V-3

Banks in the Northeastern U.S., by State (December, 1972)

Maine	75
Vermont	46
New Hampshire	106
Massachusetts	318
Connecticut	131
Rhode Island	21
New York	399
New Jersey	230
Pennsylvania	438
Delaware	20
Total	1,784

Source - Federal Deposit Insurance Corporation

The types of organizations most likely to be interested in scientific and technical bibliographic data bases would be those with a continuing, substantial R&D activity, namely:

1. Large manufacturers of consumer and industrial goods which perform their own product R&D.
2. Organizations which perform research and development under contract for other organizations, primarily the federal government.

As has been stated, there are approximately 1,900 manufacturers of consumer and industrial goods in the Northeast with annual sales of $10 million or more (see Exhibit V-1).

It is very difficult to establish with any precision the number of contract R&D firms in the Northeast. This is largely because the classification schemes used by major collectors of statistics on business (U.S. Census, Standard & Poor's, Dun & Bradstreet, the National Science Foundation) do not readily permit extraction of this information.

Contract R&D firms are categorized under a number of different SIC codes; the classification that is most directly relevant is 7391, Research and Development Laboratories. The 1973 Standard & Poor's Register lists 64 Northeastern firms under this code; their distribution is shown in Exhibit V-4. It must be emphasized, however, that this is only a partial listing. Its value lies in the fact that it probably reflects fairly accurately the geographic distribution of contract R&D firms.

The National Science Foundation collects data on the expenditure of funds for industrial R&D, but does not currently have any information on the number of firms spending these funds. Totals from the Foundation's most recent compilation are given in Exhibit V-5. (Note that the geographic distribution of expenditures is consistent with that for R&D laboratories.)

In summary, it is reasonable to assume that any significant commercial or industrial market for census or bibliographic data bases which does exist will lie within the types of organizations described above. Further, the tables presented above suggest that the market for census-data services is probably most concentrated in New York and Pennsylvania, while the market for bibliographic services is likely to be concentrated in New York, Massachusetts, New Jersey, and Pennsylvania. However, since the current study did not make provision for field surveying of this market, no estimates of the actual size or specific nature of the potential market for NASIC services can be drawn at this time.

EXHIBIT V-4

Commercial Research and Development Laboratories in the Northeast, by State, 1973

Massachusetts	16
Connecticut	8
Rhode Island	2
New York	21
New Jersey	11
Pennsylvania	5
Delaware	1
Total	64

Source - Standard & Poor's Register

EXHIBIT V-5

Expenditure of Funds for Industrial Research and Development in the Northeast, 1971 (in Millions of Dollars)

Maine	$ 9
Vermont	$ 54
New Hampshire	$ 58
Massachusetts	$1,103
Connecticut	$ 613
Rhode Island	$ 49
New York	$2,000
New Jersey	$1,412
Pennsylvania	$1,200
Delaware	$ 52
Total	$6,550

Source - National Science Foundation

VI. MARKET POTENTIAL FOR CENSUS-DATA SERVICES

The following discussion is generally limited to the governmental market. This is because the academic and non-profit markets were found to be so limited, and so effectively saturated, that they cannot offer NASIC any serious market potential. A few observations will suffice as a summary:

1. Very few schools, and fewer non-profit institutions, have any interest in the census data base. Those that do have already arranged for access to the tapes--generally at no charge.

2. Several academic institutions were found to possess the tapes without actively using them, for lack of user interest.

3. No institution that does not now have the tapes--or free access to them--expressed any interest in their use in future.

4. Interest in census data alone appeared nonexistent among academic institutions. Those that use census data invariably integrate them with other information of their own compiling.

Basically, then, it appears that interest in census data is restricted to government and, perhaps, the commercial sector (this latter possibility remains to be investigated). The few exceptions to this have already managed to establish arrangements with which NASIC could not compete.

A. How Many Potential Client Organizations Exist for Census-Related Services?

There are 6,545 units of local government in the 10-state NASIC region. However, this figure is not a realistic estimate of the number of potential clients, since very many of these units perform few governmental functions. For example, the counties in the New England states have few functions; they are generally concerned only with a small road program, a county court, and perhaps some health activities. Also, many of these 6,545 units have general governmental powers but are so small in population and resources that it is difficult to conceive of them as being interested in any services that NASIC may develop. From the following table it can be seen that the number of communities with more than 10,000 persons is relatively small.

EXHIBIT VI-1

Communities with 10,000 or More Population, Northeast U.S., 1970

Maine	15
New Hampshire	12
Vermont	8
Massachusetts	143
Connecticut	77
Rhode Island	25
New York	93
Pennsylvania	156
Delaware	3
New Jersey	172
	704

This figure of 704 probably exaggerates the number of cities and towns that would be interested in census and/or bibliographic data bases. For example, Fitchburg, Massachusetts, a city of 43,000 persons (one of the site visits), seemed to offer little potential for such services. On the other hand, Portland, Maine, a city of 65,000 persons (another site visit) was very advanced in the use and development of computerized planning and data systems. While the sample was too limited to draw any firm conclusions, it may be that a population of 50,000 is the threshold figure for potential interest. More extensive analysis would be required to prove this hypothesis, however. In addition, there are probably other factors as important as population which explain the level of governmental interest in such services. The point is that below a given population there may be little, if any, interest; beyond that threshold, there are likely to be several factors determining the extent of interest, one of these factors being population.

In addition to the 10 state governments and these local units, NASIC should consider the potential interest of regional planning organizations that exist in several of the states, and a few regional Councils of Governments that also engage in a variety of planning-oriented functions.

B. What Types of Revenue-Generating Activities Might NASIC Undertake Relative to Census Data Bases?

C. What Are the "Competition" Considerations of Entering into the Census-Data Services Field?

These two questions are interrelated and must be considered together. There are many uses of census data at varying levels of sophistication. To state the conclusion first--most user needs are currently being met through a broad, complex system of distribution. To the extent that such needs are being adequately serviced through "competitive" distribution networks, NASIC would find it extremely difficult to enter this market. The question then becomes--is there a residual market of needs that NASIC might consider? The answer here is "yes," but the nature of the residual needs is such that it may be neither feasible nor desirable for NASIC to enter this market.

1. Current Uses

At present, census data are used by a large number of state and local agencies, in a variety of forms, and for a variety of purposes. Among the uses being made of these data are:

a. General Information Use. This tends to be a standard cross-tabulation of census-data characteristics to provide such information as number of people, family size, age groups, incomes, etc., within a given census area. This "profile" information is available from the computer-tape printouts and from published census reports, and most users have it available in one or both forms. This is a relatively "unsophisticated" use of the data.

b. Derivative Tapes. A "moderate level" of sophistication would involve deriving a tape containing certain characteristics for a certain area from a tape having more characteristics for a larger area. There are a number of variations on the making of a derivative tape, but it presumes the availability of certain programming capabilities.

c. The Census as Base Data. In some cases, government agencies need a forecasting capability to project such things as population growth in small areas, industrial migration, sectors of employment growth, etc. To acquire such a capability, the agencies develop forecasting models, with the census tapes providing some of the data for a base period. To this they add a variety of other data that they have gathered, or which have been collected by other agencies; these data might include school enrollments, business reports, tax information, etc. This could be characterized as "high-level" sophistication in the use of census data.

d. Computer Mapping. This is a specialized technique that permits the display of census characteristics on a computerized base map of a given area. The base map itself is made by a specialized technique, using a geographic encoding tool called a DIME (Dual Independent Map Encoding) file. A DIME file to make the base map of any particular city, or part of a city, is available through the Census Bureau, or can be made by the Bureau. Once the base map is made, the demographic or housing data from the regular dicennial census can be displayed on the map with the use of a computer. This would be a "high level" of sophistication, not so much for the technique involved, as for its use being an indicator of the advanced techniques a particular planning agency is using in its work.

e. Census Data as an Instructional Aid. In some academic institutions, instructors use census data as a teaching device for student research. This tends to be at a "low level" of sophistication, primarily for demographic description of census areas.

2. Problems in Use of Census Tapes

The interviews brought out several problems in the use of census computer tapes.

a. The Census Information Is Static. That is, the data represent a kind of candid-camera shot of a given area at a given moment. And, because the Census Bureau frequently changes definitions of terms and the types of data it collects, census years are not easily compared on some kinds of information. Also, the data base offers little forecasting capability unless mixed with data from other sources. This is not a direct criticism of the census material, but it does limit its usability to "low-level" purposes, unless it is combined with other data.

b. The Information Is Highly Perishable. Since they reflect a given situation at a given time, the data quickly become stale; this presents a particularly acute problem for persons concerned with planning activities for metropolitan areas where population movements are rapid. As a result, use of census tapes *per se* drops off sharply two or three years after the dicennial census on population and housing. Since these are the most frequently used census data, the most interesting census information quickly becomes less usable.

c. Internal Complexity of the Data. Apparently there are a number of inconsistencies within the tapes (e.g., a particular characteristic in a number of small census areas may not add up to the total figure given for the aggregated area). In other words, there are frequently differences between the whole and the sum of the parts. This is but a single example; several persons skilled in the use of census tapes say that to use them properly requires highly specialized knowledge.

3. Availability of Census Tapes and Dissemination of Census Data

For persons who want to use the census tapes, there seems to be no difficulty in accessing them or contracting for census-data services from private vendors.

For example, in some cases, such as the State of New York, there is a central repository for the tapes. The State's Commerce Department is the official holder of the tapes, but they are physically kept in a central computer center. Persons who wish to use the tapes can make a request to the Commerce Department and get a printout of the information they want at no charge. The Department also provides a consulting service to help other agencies, state or local, with any special census-data needs they may have. All of this is done free of charge. In New York State also, the Office of Planning Services provides each community in the state with a community profile derived from the census tapes. Thus, in terms of "low-level" use of census tapes, New York State seems to have a rather extensive system of census-data dissemination.

The State of Massachusetts represents another model of availability of census information. There it appears that only the State Highway Department has its own tape file. But other agencies interested in census information have gone to various colleges for very low-cost printouts. The regional planning office of the Department of Community Affairs received a complete set of 1970 printouts from Worcester Polytechnic Institute at extremely low cost (WPI says it lost money on the transaction). It was a one-time arrangement; DCA, in turn, provided a duplicate set of the relevant printouts to each of the State's regional planning commissions at no cost. DCA will also make available free copies of the printouts to other agencies on request. Again, the point to be noted is the widespread dissemination of the data at little or no cost to the recipients.

At the local level, there are variations on this theme, but the clear impression is that the tapes are readily available. The Massachusetts Regional Planning Commission, covering 21 communities in north central Massachusetts, received a free printout from the State's Department of Community Affairs. The city of Fitchburg does not use census data. In Providence, Rhode Island, the city planning office had one job performed by Brown University, which owns a set of the tapes. In Portland, Maine, the city planning office had some work done by Bowdoin College; the Greater

Portland Council of Governments also went to Bowdoin for some census-data work. The State of Delaware has an agreement with the University of Delaware for cooperative use of census tapes.

In sum, it seems that there are a number of governmental, and some academic, owners of the census tapes, and the latter market their services directly in their areas. The governmental users of the data, on the other hand, are aware of who has the tapes, and apparently have ready access to both the tapes and some programming assistance. The distribution network thus seems to be rather extensive, operating at the intra-governmental level between agencies; at the inter-governmental level between state, regional, and local units.

It would seem, therefore, that the prospects for an intermediary service between users of census data and the census tapes themselves are not very bright. The *ad hoc* nature of the need for the tapes, and the existing network of tape holder-tape user relationships, would seem to preclude any significant potential for such services as are presently contemplated by NASIC.

4. Census-Related Services

While there seems to be little opportunity for intermediary services between state and local officials and census-tape files, some interest was expressed in other types of census-related services. One city planning office official, in expressing dissatisfaction with the census tapes, said he would be interested in manipulating the data to gain certain kinds of information if the software for such operations were available. He expressed the belief that many communities have had software packages developed by the Census Bureau, but the Bureau does not make a listing of them available to other communities. The suggestion here is that, at least in terms of this official's interests, a service to facilitate the acquisition and use of such software might be useful.

In another case, a regional planner expressed interest in computer-mapping services; it is possible that an intermediary service might be of some use here.

Several communities expressed a need for a variety of land-use, human-resources, and fiscal data, but the data desired would be locally generated, and thus do not seem to be something that NASIC could make available. Related to the use of such locally-generated data is the need for information systems to integrate the data into "useful" forms, the use varying with local needs.

There are, of course, a number of difficulties inherent in any service's trying to satisfy such diverse needs, even if set out as firm service possibilities: (a) the needs are highly technical, and would require any intermediary service organization to have extensive in-house technical capability, or ready access to consultants with such capabilities; (b) such needs are highly individualized, not only in terms of the specific community interests, but also in the interrelationship between the service and the characteristics of the community itself. Therefore, this type of intermediary service could not be an off-the-shelf service, but would have to be "customized"; (c) these census-related data needs, given the varied nature of individual community interests in any particular type of service, would require a "selling" approach that would tend to insert NASIC into the actual planning functions of the community. For example, to "wholesale" computer mapping may require the intermediary to first sell a planning concept.

In sum, it seems that there are census-related service needs among state and local governments, but their nature is such that they would require a marketing service and personnel capability well beyond that presently contemplated by NASIC.

D. What Types of Clients Would Be Interested in What Types, and What Amounts, of Various Services?

Within the varied governmental structures, state and local, one area of special significance is planning, the function most likely to be concerned with such information bases as census data.

There are many different arrangements for carrying out the planning function in state and local governments. At the state level, general statewide planning, such as land-use planning, is frequently carried out by a central planning office. At the same time, specific planning activities, such as transportation, housing, and economic development, are likely to be performed within specific functional departments or agencies. At the local level, the same configuration is generally found, but with some variations. In smaller communities one is less likely to find a central planning unit or, if one does, it may be very small and very unsophisticated in its techniques. In larger communities, the planning structure will, most probably, resemble that of the states. In addition, there may exist regional planning groups, as in Massachusetts, New York, and some county planning activities.

The point is that the potential for use of computerized data bases and information systems is likely to be greatest in governmental units with some type of planning function. In that planning activities, of a greater or lesser nature, are spread throughout various levels of government, the absolute number of potential users is likely to be quite high. However, this potential would tend to be modified by such factors as the penetration of the planning function into a particular level of government, the size of the planning staff, the planning budget, and the age of the planning organization. All of these variables would tend to cluster to indicate the sophistication of the planning activity. Sophistication, in turn, would presumably define the rough parameters of potential data-base users.

On the academic side, it is difficult to determine the number of institutions that may be interested in a census-data service, but it does not seem that the use of such data is very widespread. Most academicians who currently use census data do so because the tapes are readily available on campus, so NASIC is likely to find little potential for establishing any revenue-gathering activities related to this data base.

One area in which NASIC might be able to provide a census-data service would be through seminars or workshops for academic institutions on the use of census data, primarily for social-science or urban planning-oriented faculty and graduate students. This could be part of a total service package that a school would receive for a basic subscription fee to NASIC, or offered separately. If such a service is made part of the basic package, it becomes a selling point for the total service, but is then no longer an independent revenue-gathering activity.

E. How Much Is Being Spent by Various Types of Potential Clients for Census-Related Services and Products?

F. By What Means and to What Extent Could Potential Revenues from Census-Related Services Be Increased?

G. What Should Be the Price Structure for Offering Such Services?

Given the preceding discussion of uses and availability, these questions--all related to expenditures and pricing--are simply answered. Little money is being spent on use of census data *per se*; the distribution of census data is widespread, and at little cost, or (very frequently) no cost at all. Given this low-cost/no-cost dissemination pattern, there would seem to be no price structure that could successfully penetrate the census-data market.

What potential there is for "Census-Related Services" (as described above) suggests that they would have to be priced on an *ad hoc* basis. That is, the range of these services and the user needs are so individualized that a subscription-type price arrangement would probably be unfeasible and unwise. Under a subscription arrangement for such service, some users would tend to overuse the service and get services beyond their fee, while others might underutilize the service and not wish to renew on a fixed-subscription basis. The need to consider any kind of price structure for census-related services, however, assumes an affirmative decision on establishing such services in the first place.

In terms of expenditures, academic institutions are similar to state and local governments, in that they now spend little or nothing on census-data services. The major academic expenditure connected with census tapes is for their initial acquisition, and relatively few schools appear to have acquired them. Once acquired, access to the tapes by campus researchers is free.

In summary, the potential, or lack of it, for a NASIC-sponsored census service is shaped by the following factors:

1. State and local governments can be arrayed along a continuum ranging from the small and unsophisticated to the very large and sophisticated. At the lower end of this continuum, the small, unsophisticated government units have little interest in census data and census-related services, because their needs and resources are very small. At the other end there is also little interest, because the requirements go far beyond the need for a simple intermediary service. Between these extremes are varied, intermediate classes of requirements and resources--the middle-sized community (perhaps between 50,000 and 150,000).

2. The potential for a market within these intermediate-class communities is greatly diminished by the ready availability of census data from other governmental sources or nearby academic institutions.

3. The availability of these "competitive" services is made more attractive by the fact that much of this information is being provided free of charge by government organizations, and the cost of such service from academic institutions is nominal. (Within academic institutions having the tapes, campus researchers have free access; researchers from other campuses generally pay only machine-time fees.) Given the clear fact that users of such services are very cost-sensitive, the space for intermediary service is extremely narrow, if it exists at all.

4. Census-related services beyond an off-the-shelf intermediary function are likely to be feasible only if NASIC acquires a very substantial in-house or readily available technical capability, and is willing to become considerably more than an "intermediary."

VII. MARKET POTENTIAL FOR COMPUTERIZED BIBLIOGRAPHIC SERVICES

The following discussion of the research findings for each of the markets examined in this study--(a) the college/university sector, (b) the governmental sector, and (c) the non-profit institutional sector--is presented in terms of the research questions posed in the project RFP.

A. To What Extent, and by Whom, are Existing Bibliographic Services Being Used in the Northeast Region?

In general, CSG found a low level of past, present, and anticipated future usage of automated bibliographic information services, in all three of the sectors studied.

1. For the College and University Sector:

a. This finding encompasses all of the scientific data bases included in the scope of the study.

b. This finding encompasses virtually all types of academic institutions included in the study, with a slight exception being the largest and/or most research-oriented schools.

c. A strong library system and director appear to stimulate on-campus usage, where it exists. However, most institutions lack the resources (in financial support and staff positions) for data-base acquisition, subscription, and use.

d. The SUNY system receives (or will soon receive) state-supported, on-line data-base access through the State of New York Office of Higher Education.

e. Schools with library science programs, automated library systems, and Ph.D. programs in the sciences tend to have greater data-base usage than other institutions, though still limited in an absolute sense.

f. The research team discovered a few instances of on-campus data-base development designed to meet the unique and specialized needs of individual faculty members.

The lack of bibliographic data-base usage among colleges and universities appears to result from four major factors:

a. Limited financial resources available for subscription and use at the central administration level, in the library, and within academic departments.

b. Limited Awareness of the existence and availability of relevant data bases among individual researchers and administrators.

c. Limited library staff awareness of data base availability and expertise with data base technology.

d. Faculty apathy regarding data-base usage, as a function of lack of awareness, dissatisfaction with past data-base use, ignorance of potential benefits, or "role behavior" (the "invisible college").

In summary, it appears that a general lack of awareness, knowledge, and interest among campus researchers, librarians, and administrators has combined with limited availability of financial resources to result in low levels of use.

2. For the Governmental Sector:

The research team discovered a complete absence of bibliographic data-base usage in past, present, and anticipated future activities. This is the result, quite obviously, of the inappropriateness of the subject matter contained in scientific data bases to governmental planning and legislative activities. A typical response was the conjecture that if the service were inexpensive it might be used in the future for research on special planning problems, particularly in the Human Resources and Urban Affairs areas.

3. For the Non-Profit Sector:

CSG's study team found very little use of bibliographic data bases, whether past, present, or planned. There are several reasons for this, all of which would tend to limit interest in NASIC services.

Researchers in non-profit research institutions see themselves (probably correctly) as operating at the frontiers of their fields. The first consequence of this is that they rely on the "invisible college" to provide scientific information even more heavily than do academic researchers. (It seems, too, that the "invisible college" may work somewhat more effectively for researchers in non-profit institutions than it does for academicians.)

A second result of this concern with the "leading edge" of their fields is that the researchers are extremely sensitive to deficiencies in bibliographic data bases and services derived from them. Several researchers who had used Index Medicus and MEDLARS, for example, said that they knew of relevant documents that had been omitted. Such researchers are also very sensitive to ambiguities or weaknesses in indexing systems.

A third result of the researchers' preoccupation with the most advanced work in their fields is that they place great importance on the currency of information. The time that elapses between a document's initial publication and its subsequent coverage by a bibliographic processor is important to them. At least as important, though, is the fact that the work described in the initial publication is already several years old. It is worth noting that Current Contents was by far the most popular bibliographic publication in the institutions studied, both for the currency of the material and the convenience of the physical format. In their own specialties, the researchers in non-profit institutions are keenly interested in research currently in progress, little of which is covered in bibliographic data bases.

Several of the non-profit institutions that were studied did not have libraries of their own, or, if they did, these were very limited in size and scope. Where this was the case, it was invariably because the institutions had ready access to other libraries, which seem to satisfy their researchers' needs. In such cases, there would be little scope for NASIC to provide services directly to the non-profit institution.

A final limitation on the use of bibliographic data bases in non-profit research institutions lies in the fact that, generally, each institution's focus is so specialized that only very small subsets of any particular data base are likely to be relevant. (This peculiarity of focus may be either a very narrow topical specialty, or interest in only one particular "level" of research in a certain field.)

CSG found two positive conditions that should partially offset the negative factors just described.

First, researchers in most of the institutions studied were very regular, active users of bibliographic publications. By definition, therefore, they are interested in the contents of at least some data bases. Having used the printed publications, these researchers should be relatively sensitive to the attractiveness of computer searches of the data bases.

Second, administrators in non-profit institutions, while cost-sensitive, seemed less dismayed than their counterparts in academic institutions by the problem of finding money to pay for information services. Their basic position was that if a service were really worthwhile, money would be found to pay for it.

In general, then, the situation seems to be this:

a. The number of non-profit institutions doing substantial scientific research is relatively small. The majority of these institutions are interested in some special aspect of the life sciences.

b. Of necessity, researchers in these institutions have developed ways of acquiring information that they need for their research. Rarely do computerized information services figure in this (MEDLINE was the most frequent exception), although printed bibliographic publications are widely and frequently used. In some cases, researchers have had unsatisfactory experience with computer searching of bibliographic data bases. Researchers in the life sciences generally have access to MEDLINE, usually at no charge.

c. Although there may be latent interest in services derived from computerized bibliographic data bases, and although non-profit institutions may have relatively little difficulty budgeting the acquisition of these services, it seems very unlikely that NASIC would find this market an easy (or especially profitable) one to develop. Services that would appeal to researchers in such institutions would have to be very specialized and sophisticated; even then, the services' appeal would depend very much on the accessibility of particular data bases. In short, whatever market may be found among non-profit institutions is likely to develop only after NASIC services have been well established, and the market will be of limited size.

B. What is the Extent of Potential Interest in Available Computer-Based Bibliographic Services in the Northeast Region?

In general, the research team found the highest potential interest in future bibliographic data-base usage in the Northeast in selected sub-segments of the college and university market. At the other extreme, the research team found that the government sector will not, despite aggressive marketing efforts, develop into a potentially profitable market because of the inappropriateness of the contents of most bibliographic data bases to governmental activities. Finally, non-profit institutions offer, in the opinion of the research team, only limited, long-term potential as a market for NASIC-sponsored activities, due to their highly specialized interests. As a result, the remaining discussion of this question relates to the college and university market.

In general, three organizational patterns were found among the academic institutions included in the sample. These three organizational types represent three distinct potential targets for NASIC-sponsored activities. It should be noted that, because of the sample's limited size, few directly quantitative measures are used in defining these organizational types. However, the research team believes that, in fact, these broad categories (1) were recognizable during the interviewing process, and (2) do define levels of institutional interest in potential NASIC services.

1. Type-A Schools: The High-Potential Sector

a. General Characteristics:

(1) There is substantial funded and/or sponsored research on the campus in a variety of scientific disciplines.

(2) The central administrative unit actively promotes research on the campus (via newsletters, information dissemination, proposal review, etc.).

(3) Ph.D. programs exist in several academic disciplines.

(4) Research is conducted at the college or department level, in addition to research institutes operated by separate academic units.

(5) A research council--within the central administration--represents a key policy and access point which crosses disciplinary lines.

b. Library:

(1) Interest is high in applications of ADP to daily activities; this affects, in turn, the outlook toward automated data bases.

(2) Strong leadership at the highest level of the library affects the budget-allocation process for staffing, equipment, etc.

c. The Computer Center is:

(1) Progressive and aggressive in promoting on-campus utilization of the facility, possibly offering workshops or newsletters.

(2) Involved in some form of on-campus or intercampus networking.

(3) Heavily utilized to support research, along with its management-support activities.

d. Illustrative Type-A Schools Include:

(1) Pennsylvania State University

(2) Syracuse University

(3) Cornell University

(4) Columbia University

(5) Rensselaer Polytechnic Institute

(6) University of New Hampshire

(7) Dartmouth College

(8) University of Pennsylvania

(It should be noted that not all of the attributes listed above will be found in every high-potential school. Most important, in all probability, will be the first three general characteristics.)

2. Type-B Schools: The Medium-Potential Sector

a. In general, these institutions do not possess the resources of the Type-A schools. However, they do exhibit enough Type-A characteristics--plus a positive research atmosphere--to warrant a direct marketing effort (second priority) from NASIC.

b. Illustrative Type-B Schools Include

(1) Boston University

(2) Wesleyan University

(3) Brown University

3. Type-C Schools: The Low-Potential Sector

a. General Characteristics:

(1) Extremely limited funded and/or sponsored research on the campus with, more importantly, little research emphasis expected in the future.

(2) The central research unit (if such exists) is a passive, caretaker organization which does not actively promote research in any way.

(3) The college and its departmental units do not provide an organizational context for research.

b. The library operates under a limited concept of service objectives--no automation, limited staff capability, etc.

c. The computer center provides, at best, straightforward management functions (e.g., accounting, enrollment, etc.), with little or no network application and teaching functions.

d. Illustrative Type-C Schools Include

(1) Tufts University

(2) University of Bridgeport

(3) Glassboro State College

While the primary criteria for developing the above classification of potential clients were qualitative, it is reasonable to assume that certain quantitative indicators would also be relevant in determining the potential academic market. Such quantitative factors might be size of school, amount of funded research, distribution of this research support across academic departments, number of graduate students and ratios of natural-science to social-science studies. Indeed, some of these quantitative indicators were crudely employed in developing the qualitative classifications. It was not possible, however, within the present study to develop a set of independent, quantitative variables that could be tested across a large enough sample to make them valid.

In summary, the research team found that Type-A schools represent the best potential market for NASIC's services. These institutions are best characterized by (1) reasonably substantial on-campus research activities, and (2) extensive doctoral programs in the sciences. Type-A schools, categorized in this manner, probably number about 50 schools in the 10-state region.

It is also possible to categorize individual academic researchers according to levels of interest:

1. Type A: High-Potential Users (Aggregate)

a. Low to moderate awareness, interest, and usage of bibliographic data bases in past and present activities.

b. Somewhat positive attitude (at least non-negative) toward a NASIC-like concept, but no clear idea of how to obtain, use, or pay for NASIC services.

c. Relatively active research interests and activities, though not of the "superstar" type (where the "invisible college" tends to supplant potential NASIC services). The exception to this last qualification is the very active, sophisticated researcher with multidisciplinary interests, whose needs for information are so diverse that informal information exchange cannot supply them.

2. Type B: High-Potential Users (Individualized)

The research team found, in virtually all campus visits, at least one individual faculty member who has attempted, through high personal involvement, to obtain and utilize data bases for teaching and researching. However, the efforts of these individuals, while recognized by administrators and colleagues on the campus, have not stimulated widespread interest among other groups.

3. Type C: Low-Potential User

a. Believes that his needs are satisfied by his own library and/or the "invisible college."

b. May have had unsatisfactory experience with automated bibliographic services.

c. Generally exhibits a strong negative attitude toward automated data bases, which he regards as a nuisance, a threat, or simply of limited value.

d. May have graduate students or assistant do his bibliographic research.

In summary, it appears that rather distinct types of colleges and universities can be defined through a qualitative (and, although not attempted here, quantitative) appraisal of their organization, functions, and institutional policies. Furthermore, within each organizational type (excluding, for the most part, Type-C schools), it is possible to delineate three types of potential users, according to several behavioral and attitudinal variables. However, the particular organizational type and researcher classifications appear to be a function of factors unique to a particular institution. In addition, due to the constraints limiting this study, it is not yet possible to specify aggregate organization-researcher ratios (i.e., it is not possible to say, for instance, that most Type-A researchers reside in Type-A institutions)--since these relationships reflect unique, individualized processes on the campus.

Overall, to increase the level of interest within Type-A (first priority) and Type-B (second priority) schools, it appears that NASIC must focus its available resources on (a) increasing awareness and knowledge of data bases, and (b) providing a means or rationale for resource allocations for data bases within the budgetary process. These two requirements will, in essence, force NASIC to evaluate each institution on a case-study basis to define needs, organization, status, key access points, influence points, and funding potential.

C. What Are the Strong Areas of Subject Interest in Currently Serviceable and Available Computer-Based Bibliographic Services?

The potential users' lack of awareness of bibliographic services, and inexperience with their use, made it difficult to relate their interests to specific data bases in the informal interviews on which the study team had to rely. Identical examples of past or current activity were often cited by those interviewed at a given institution.

In general, however, the impression developed by the research team was as follows. Most academic research is organized along departmental lines, so that in broad outline it conforms to the traditional distinctions among disciplines. Since most of the bibliographic services in existence reflect some disciplinary orientation, they correspond fairly closely to this general system of subject organization.

Within these departmental/disciplinary boundaries, however, there tends to be great heterogeneity of specific research interests. It is possible that these particular interests tend to form clusters (certain topics tend to be "popular" within a particular discipline at any given moment), and NASIC should plan to attempt identification of such clusters during future contacts.

It is worth noting that the highly specific topics of concern to individual researchers often cross disciplinary lines. As a result, an individual's major interests might coincide broadly with the contents of a single data base, but a small number of other highly relevant items may be found in several data bases concerned with other fields. The exception to this pattern is the researcher with well-defined cross-disciplinary interests. Although few in number, these researchers seem much more acutely sensitive than any others to their need for help in maintaining awareness of professional literature. The needs of on-campus research institutes also cross disciplinary boundaries and are an exception to the subject organization. These cases will generally require both broader and deeper assistance by NASIC.

In summary:

* The "hard" sciences: The research team was unable to identify any particular profile of subject interest, because of the limited sample and the respondents' lack of awareness. The interest that was expressed was articulated either in global terms (e.g., "chemistry"), or in terms so specific that they could not be readily related to available data bases without special expertise.

- The "soft" (social and behavioral) sciences: In general, social scientists appeared to resemble physical scientists regarding awareness of data bases and previous experience with them. They generally seemed. however, more "literature-oriented" than physical scientists, and somewhat more receptive to the possibility of using innovative techniques to find relevant literature. The limitation on their potential as an audience for NASIC is twofold: there are fewer data bases in the social sciences, and monetary resources tend to be more limited.

In the governmental sector, as stated previously, no significant present use of bibliographic data bases was found, and only minimal interest was expressed in future use, possibly for special planning-related research projects.

In the non-profit sector, the prevailing attitude displayed toward bibliographic data bases, regardless of subject matter, was polite, interested skepticism. Research interests tend to be very narrowly defined (they may be more specific than the indexing systems of most pertinent data bases), and reliance on the "invisible college" was heavy. Furthermore, because the researchers function at the leading edges of their specialties, the age of materials covered by bibliographic services (including total lag time between initiation of a project and its description in a primary publication, as well as the processing lag of the bibliographic operation) was seen as a serious defect. As has been pointed out, most of the major non-profit research institutions in the Northeast are interested in the life sciences. More specifically, their interests are biomedical; no single data base (not even MEDLARS), however, coincides entirely with their fields of interest.

D. How, and to What Extent, Can the Use of Computer-Based Bibliographic-Data Services Be Increased in the Northeast Region?

The following strategy recommendations, which encompass study findings presented throughout this report, suggest the types of marketing programming which NASIC should develop and implement. In addition, the discussion here provides a foundation for the financial analysis of potential revenue that appears in Section E of this chapter.

1. The College and University Market

As reported previously, this market is now characterized by extremely low levels of data base awareness and usage. In addition, resource allocations for data base acquisition and usage were found, at best, to be extremely limited and unstable. In essence, then, the current market consists mainly of customized search services, provided on a very limited, disjointed basis, to isolated groups of users.

Obviously, such a market pattern offers only a limited opportunity for the type of activities originally envisioned by NASIC. Consequently, the CSG study team has attempted to define a systematic series of additional marketing activities that aim toward both the short- and long-term success of NASIC. The premise for these activities is that more than the simple sale of retrospective searches and current awareness services will be required for NASIC to become self-sustaining. Revenue contribution from several marketing program tracks will be necessary.

a. The Market--

The study findings suggest that the Type-A academic institutions, which were discussed in the preceding sections, represent the market with the greatest revenue potential for NASIC. In essence, this group of schools--which probably includes about 50 institutions in the 10-state region--should receive an intensive marketing effort from NASIC. Only after this segment is thoroughly covered should NASIC marketing activities be extended to the Type-B academic segment--which may account for another 75 institutions. In any event, it appears that marketing efforts directed toward Type-C schools will not generate acceptable revenue levels for NASIC, and the marginal utility is negative.

b. The Strategy--

A tripartite marketing strategy must be developed and implemented by NASIC if data-base usage is to increase. In essence, the objective of such a strategy is summarized in the concept of "organizational change"--the goal of creating an organizational environment and rationale for increased data-base usage in Type-A (and eventually Type-B) institutions.

Such a concept requires that NASIC marketing activities define and influence the role structures of university personnel at the levels of: (1) the central administration, (2) the library directorship, and (3) the academic units and individual researchers. At all three levels, NASIC marketing activities must--

* increase awareness of the availability of potentially useful data bases

- create and sustain high levels of interest in the utilization of available data bases as (1) research, and (2) teaching resources
- develop an energized state of desire for the usage of available data bases by establishing cost and benefit relationships
- create the tendency for action (actual database usage) among the three institutional elements by providing an organizational rationale and justification for purchase of NASIC services.

In summary, CSG recommends that all three levels (central administration, library, and individual academic unit/researcher) be included in NASIC marketing efforts. This conclusion is based on the belief that all three of these levels must be included in the organizational change that must take place if NASIC's objectives are to be achieved.

c. The Products--

CSG recommends three major service concepts to NASIC for the academic market. These concepts could not be validated within the present study, but they derive directly from the conditions that CSG observed; they were designed to constitute, together, a NASIC service program. They include:

(1) The Annual Service Agreement: In the short run, the first marketing activity that should be undertaken by NASIC is the development of a yearly retainer or fee agreement. The components of such an agreement--which might be offered for approximately $3,000 a year--could include:

- data-base consulting services involving:
  --library staff training in the use of data bases

--"dial-up" assistance to faculty and library staff interested in data bases or any aspect of their use

- a newsletter, for faculty and library staff, which updates information on data-base availability, etc.
- general seminar for the library staff and faculty groups on developments in data bases and their application for research.

Although the term "Annual Service Agreement" is used in this report, to emphasize the provision of services by NASIC, it would be better presented to prospective supporters in the context of sponsorship of the NASIC program for the benefit of the entire region. The Agreement should be proposed to institutions with substantial resources and the cachet of academic leadership. The services they receive as a result of this Agreement would not be the overriding reason for their financial contribution, but would be in keeping with the special benefits often accorded to major contributors to non-profit activities.

The key access point for offering such an Annual Service Agreement appears to be either (a) the dean or vice-president for research, or (b) the director of libraries. Unfortunately, one cannot generalize as to which of these will be the key access point on any particular campus because of variations from one institution to another. As a result, NASIC will be forced to determine the key access point for this service on a case-by-case basis.

In general, however, it appears that NASIC should market this service by first approaching the dean or vice-president for research. This recommendation stems from several features of the role normally assumed by this individual: (a) the Annual Service Agreement requires, in the long run, policy decision; (b) this product involves a reasonably high financial commitment, which will not come from normal budget allocations in the short run; (c) the impact of the program should be campus-wide; and (d) this service needs support from potential participating academic units; this is best achieved through "research councils" and other efforts normally sponsored by the dean's office.

However, it should be recognized that the director of libraries will play a key role in the on-campus promotion and implementation--if not the funding--of the activities included in the Annual Service Agreement. For instance, the training of library staff, data-base consultation, faculty search capabilities, and general faculty seminars on data-base utilization will all require the active professional support and interest of the director of libraries. As a result, NASIC should make every effort to build support for the Annual Service Agreement within the library. Such support must then be used to influence decision-making on policy and resource allocation at the central administration level (dean or vice-president for research).

In summary, the Annual Service Agreement includes the following benefits:

- For NASIC--
  - --short-run and long-run revenue generation on a stable basis
  - --increased levels of awareness, interest, desire, and action within the institution which can be used as the basis for selling other products and services

--organizational support and involvement from two critical units on the campus.

- For the Library--

  --a better opportunity to fulfill user needs and library role potential through the introduction of contemporary technology

  --an initial, partial justification for library resource allocations for continued data-base development on the campus.

- For the Central Administration--

  --an opportunity to introduce a major new teaching and research resource to the campus at reasonable cost

  --an opportunity to generate, at the policy level, future budget allocations for database development.

Finally, it should be re-emphasized that the central administration (through discretionary funds) or the library (through available, budgeted funds) will be the primary access and selling point for this service.

(2) The Specialized Seminar Series: The magnitude of the educational task confronting NASIC was one of the study's most striking findings. While this task must be approached at the levels of directors of research and of active researchers, maximum long-range impact will result from successful orientation of future researchers. The best vehicle for this would be training modules, offered by NASIC, that could be introduced into curricula of advanced undergraduate and graduate education.

As a result, CSG recommends that NASIC develop a series of specialized seminars which would focus on building linkages between user demand and available data bases. In general, these seminars--

- would extend and build on the general seminar activities (which take place in the library) in a specialized manner
- would be subject-specific or, where appropriate, would be developed for specialty areas within particular disciplines
- would assist potential users to define their information needs in a clear and realistic fashion
- would continue to reinforce awareness, interest, desire, and action tendencies among user groups
- would utilize "demonstration teaching" methods and would focus on research and teaching applications.

The on-campus access and funding points for this type of service appear to be individual academic units (individual departments, colleges, or research institutes). However, it should be recognized that administrators within any of these units will not allocate funds for this purpose (estimated to be around $500.00 per seminar) unless "grassroots" support--among individual faculty members--is generated. As a result, NASIC must build faculty enthusiasm for these special seminars through (a) the general seminar activities, (b) newsletters for faculty, and (c) individual selling efforts.

In addition, NASIC must recognize that substantial developmental efforts will be required to develop "user-oriented" seminar programs. In this respect, NASIC must: (a) identify those disciplines (or specialty areas within disciplines) which are most in need of specialized seminar activities; (b) identify the specific nature of the user need/data base match in the subject area; and (c) develop effective programmed learning and communication alternatives. These developmental efforts will require that NASIC allocate presently existing resources for this purpose or, more probably, secure additional, external funding explicitly for this purpose.

The benefits of the specialized seminar series include:

- For NASIC--
  - --revenue generation in both the short and long run
  - --high profitability potential after initial developmental costs are recovered
  - --continued development of the entire on-campus program in a comprehensive fashion.
- For Individual Academic Units and Users--
  - --continued development of data-base information services as a campus resource with teaching and researching implications
  - --continued development and implementation of the campus-wide policy commitment to data bases which has been started through the Annual Service Agreement
  - --increased access to relevant, useful information services.

In summary, the specialized seminar series concept begins to customize (in terms of user needs) the general level of data-base awareness and penetration which should evolve through the Annual Service Agreement. It is therefore a logical extension of the Annual Service Agreement in both concept and substance and. in addition, provides an additional revenue source for NASIC. Furthermore, the specialized seminar series reinforces user awareness, interest, desire, and action, and provides a basis for the implementation of the third major NASIC revenue source--the research-oriented revenue-source program.

(3) The Research and Information Development Process: The third major marketing program that the study team recommends to NASIC emerges from the nature of the research process on the campus. This third revenue source for NASIC is not a specific product or service (as in the case of the first two recommendations), but a program that involves NASIC representatives working with individual faculty, departmental/college-level administrators, and central administrative personnel, to ensure that provisions for automated information services are included in all stages of the research funding process. This notion is summarized schematically in Exhibit VII-1.

In essence, the rationale or justification for such a developmental process can be summarized in the following manner.

(a) This program, when considered in the context of total funded research in Type-A schools in the 10-state region,

EXHIBIT VII-1

The Research Funding Process

Steps in the Funding Process	Questions to Be Answered by NASIC
PRE-PROPOSAL PLANNING (Individual Researcher)	1. What data bases are available and applicable for: (a) proposal preparation and (b) project implementation? 2. Is the individual researcher aware of these data bases?
PROPOSAL PREPARATION (Individual Researcher/ Department)	1. What searches are needed for proposal preparation? 2. What provisions for automated searches should be included in the project budget?
ON-CAMPUS REVIEW (Central Administration)	1. Have data bases been used in the preparation of the proposal? Why or why not? 2. Has data-base access been provided in the proposed project budget?
SPONSORING AGENCY REVIEW	1. Will data-base provisions enhance the acceptability of the proposal? 2. What budget guidelines are applicable in providing for data bases?
PROJECT IMPLEMENTATION	1. Can the researcher use appropriate data bases efficiently and effectively? 2. What activities are needed on campus, or by NASIC, for data base usage?

represents an integral part of NASIC's long-run revenue generation. Furthermore, the program should have great appeal for Type-B (and perhaps even Type-C) schools--schools without the resources for the Annual Service Agreement and the special-seminar program. In essence, for these latter schools, the acquisition of data-base access can "pay for itself" through the grant or contract process.

(b) This type of program is an obvious extension of the first two NASIC services. While the Annual Service Agreement and special-seminar programs should stimulate awareness, interest, and desire for data-base utilization, this program enables researchers to actually integrate automated information services with on-going research. In essence, then, this program actualizes or crystallizes some of the market potential which is established through the first two NASIC services.

(c) From an individual researcher's viewpoint, this program can lead to--

- more effective and efficient proposal planning
- more effective and efficient proposal preparation
- more effective and efficient project implementation
- continued justification of the special-seminar program at the departmental or college level.

(d) From the central administration's perspective, this program can lead to--

- increased levels of funding on the campus

- the development of a campus resource base over time
- data-base usage on the campus at no out-of-pocket costs to the university
- continued justification of the Annual Service Agreement.

(e) From the library director's perspective, this program can lead to--

- a rationale for increased budget allocations for data acquisition
- a rationale for continued development of automated capabilities within the library (the "new" technology)
- continued support for the Annual Service Agreement.

To successfully implement this programmed process for integrating automated data services into the on-campus research effort, NASIC must evaluate: (1) the attitudinal structures of potential participants; (2) the functional characteristics and relationships between the central administration, the library, and the individual researchers; and (3) existing and potential communication channels among the potential participants so that recognition and implementation of this approach is effected at all three levels.

In summary, this program is a "research-oriented" NASIC package (while the first two NASIC services tend to be educationally oriented). However, this program will require intensive marketing efforts at all three organizational levels if long-term success is to be achieved.

d. Product Summary

Exhibit VII-2 summarizes the three major NASIC product offers and key access points.

Two additional topics must be briefly discussed in relation to these three potential NASIC product offers. First, NASIC should recognize that all three of its product offers are intangible in nature. As a result, NASIC must recruit extremely well-qualified people to implement each of these programs. In general, the qualifications which NASIC field staff and home office personnel need include:

* general expertise in data-base technology
* excellent verbal skills--to institute the educational programs encompassed in the Annual Service Agreement and the specialized seminar program, and to successfully market NASIC services to an academic clientele
* an advanced degree--for entree purposes during initial market development
* sound general knowledge of research interests in a variety of disciplines
* a temperament compatible with academicians, coupled with energy and initiative.

The second additional topic concerns the long-run objective of NASIC. Succinctly stated, all NASIC marketing activities should lead, in the long run, to the development of a situation in which budget allocations (in the library and in the academic units) for data-base access are made on a continuing basis. In other words, if sufficient awareness, interest, and user satisfaction accrue through the three NASIC products discussed previously, then it appears reasonable that regular budget

EXHIBIT VII-2

A Tabular Presentation of NASIC Product Offers by Organizational Units and Functions

Academic Units		NASIC Product Offers
Organizational Unit	Organizational Function	
Central Administration: Dean/Vice-President for Research	● Policy decision-making ● Research support -proposal review -project accounting -project support ● Communication	● Annual Service Agreement
Campus Library: Director	● Information support services	● General Data Base Seminars (and other facets of Annual Service Agreement)
Academic Units: (1) Research Institutes (2) Departments (3) Colleges (4) Individual Users	● Teaching ● Research -funded -non-funded -graduate-student	● Specialized Seminar Series Program ● Research and Information Development Process

allocations for data-base use can be achieved in the long run. Until this stage of market development occurs, the stability of NASIC cannot be assured.

2. The Governmental Market

The study team did not find significant interest in or usage of bibliographic data bases in this market. Furthermore, it is highly unlikely that it will become a significant market for NASIC services in the foreseeable future. As a result, the CSG study team contends that this market should be ignored in NASIC marketing efforts.

3. The Non-Profit Market

While this market exhibits greater potential than the governmental sector, it appears to rank well below Type-A (and possibly Type-B) colleges and universities in terms of overall potential. While researchers in this sector are information-conscious, the "invisible college" factor and the unique organizational characteristics and research patterns which dominate the sector tend to diminish its overall potential for NASIC services. The one favorable aspect of the non-profit market is that it can, generally, find funds more easily for the services it wants. Of the three market sectors, it appeared to express least pessimism regarding expenditure of funds.

As a result, the study team does not recommend that a NASIC marketing effort be undertaken among these institutions until the Type-A and Type-B universities are comprehensively covered. However, if scattered non-profit institutional interest emerges as an outgrowth of NASIC activities in the college and university market, opportunities in this market can be grasped through programs and products identical to those recommended for the academic market. For instance, the research team found that the Brookhaven National Laboratory, Long Island, New York (which is closely affiliated with supporting universities and resembles, in organizational type, a Type-A university) does exhibit some market potential. Some of the other non-profit institutions included in the study exhibited limited potential, as well.

In summary, then, NASIC activities in this market should not represent substantive, planned efforts. Rather, NASIC should be equipped to respond to individual institutional needs when, and if, such needs emerge on an isolated basis.

4. Summary

This section of the report has evaluated the market potential for services that NASIC might derive from bibliographic data bases, in relation to: (a) the college and university market, (b) the governmental market, and (c) the non-profit institution market. Discussion of the commercial sector was not included here because it was not evaluated through case studies. However, this sector is discussed, in a macro context, in Chapter V.

In general, the study team concludes that the Type-A universities and colleges should receive substantial marketing efforts from NASIC. After they have been cultivated the Type-B university and college market and the non-profit market should be developed. Furthermore, it is recommended that the Type-C universities and colleges, and the governmental sector, not receive NASIC marketing efforts in the foreseeable future, except through a higher-level (e.g., state) organization, or as a satellite to a Type-A or -B institution.

In addition to these general conclusions, three types of NASIC products and/or services have been described and discussed in terms of an overall marketing program. In the next section, the revenue potential of each of these is discussed in greater detail.

E. A Potential Revenue Analysis for NASIC Services

The preceding two sections of this report have described many of the study findings and proposed service alternatives from a qualitative perspective. This section focuses on a financial analysis of potential revenue sources and an associated cost structure for NASIC during future short-term phases of the NASIC project.

1. Assumptions

Several assumptions are used in this analysis. These are:

a. The following potential revenue and cost analysis is focused on the college and university market segment. No provisions for revenues or costs have been made for the non-profit institution market, the governmental market, or the commercial market. This assumption, in essence, represents the study team's belief that these three markets offer only limited short-term potential for NASIC services. Obviously, any unplanned or unanticipated revenues which accrue from these segments will be beneficial to NASIC's overall position.

b. The NASIC fiscal year (FY) is from March 1 to March 1; the dates by phase are:

Phase 2 - 1 March 1974 to 1 March 1975 (FY 74)
Phase 3 - 1 March 1975 to 1 March 1976 (FY 75)
Phase 4 - 1 March 1976 to 1 March 1977 (FY 76)

c. NSF funding will continue at no more than $300,000/ year for Phases 2 and 3 (FY 74 and 75), and may even be reduced substantially.

d. NASIC must be self-supporting in Phase 4 (FY 76), when all NSF funding terminates.

e. All NASIC revenues in excess of $10,000 and obtained during Phases 2 and 3 will be deducted from the NSF $300,000/FY funding limit.

f. Revenues will be generated from all, and only, the three NASIC services described above in Section D. This is based on the premise that no one or two of the three will have the potential to generate sufficient revenue soon enough. Also, all three are required for effecting the most advantageous long-term as well as short-term benefits to NASIC.

Other assumptions are described throughout the discussion of the financial analysis.

2. Sources of Revenue

NASIC is currently generating nominal revenues from existing test sites (e.g., MIT) and some unsolicited requests.

However, before any substantial revenues can be expected, several activities for the marketing program require concurrent implementation. Some additional revenue may result during the development and implementation of the marketing program for each of the three service offerings. Substantial revenues will not be generated, however, until after an initial period of concept and market testing, and the development of marketing strategies for the program. Then, as an intensive marketing effort is continued, revenues should increase accordingly.

Exhibit VII-3, Sources of Revenue, depicts the projected dollar amounts of NASIC revenues for Phases 2, 3, and 4 (FY '74, '75, '76), based on estimates of sales response to the service offerings at assumed price levels. The three service offerings and their price levels are: (a) Annual Service Agreement--$3,000 per institution per year; (b) Specialized Seminar Series --$500 per course per institution; and (c) Research and Information Development Process--$25 net ($100 charge minus $75 cost) for retrospective searches and $75 net ($300 charge minus $225 cost) for the Selective Dissemination of Information service. NASIC total revenues are projected at just under $50,000 by the end of Phase 2; about three times as much (approximately $150,000) by the end of Phase 3; and doubled again, to $300,000, by the end of Phase 4.

Since NASIC is to be self-supporting by the end of Phase 4, this date represents the critical point in projecting future revenues. The corresponding costs for the marketing effort, service

EXHIBIT VII-3

Sources of NASIC Revenue by Phase and NASIC Service

	Phase 2 (FY 74)			Phase 3 (FY 75)		Phase 4 (FY 76)	
NASIC SERVICE	March 74-August 74	September 74-February 74		March 75-February 76		March 75-February 77	
Track I Annual Service Agreement	*Concept and Market Testing *Strategy Development	15@$3,000	$45,000	15@$3,000=$45,000 20@$3,000=$60,000	$105,000	15@$3,000=$45,000 20@$3,000=$60,000 15@$3,000=$45,000	$150,000
Track II Specialized Seminar Series	*Concept and Market Testing *Strategy Development *Proposal *Receipt of Funds	*Specialized Seminar Series Program Development		40@$500	$ 20,000	40@$500=$20,000 40@$500=$20,000	$ 40,000
Track III Research and Information Development Process	*Concept and Market Testing *Strategy Development *Nominal Revenue	50@$25=$1250 10@$75=$ 750	$ 2,000	175@$25=$4375 20@$75=$1500	$ 5,875	3080@$25=$77,000 440@$75=$33,000	$110,000
Total Revenue	*Nominal	Total	$47,000	Total	$130,875	Total	$300,000

offerings, and other NASIC operations are discussed below in Subsection 3, Uses of Funds, following more detailed discussion of Exhibit VII-3.

Phase 2--As shown in Exhibit VII-3, the first six months of Phase 2 are scheduled for the simultaneous marketing program activities corresponding to the three service offerings. The two essential activities of concept and market testing, and strategy development, pervade all three program tracks. Additional analysis and research, in the form of concept and market testing, should be considered by NASIC in conjunction with detailed discussions of specific service offerings with the market segment of high-potential academic institutions. In order to establish this market, four criteria must be met on both a qualitative and quantitative basis. Many of the qualitative criteria have already been presented in the discussion of the Type-A academic institutions. Quantitative criteria would include such factors as the size of student body, size of faculty, dollar amount of scientific and social research, library size and budget, library staff, etc. Some examples of variables to be included in a concept and market test are: price elasticity for the Annual Service Agreement and the Specialized Seminar Series; modification of the content and timing of these service offerings, the method of marketing and promoting, and network structure of NASIC's planned operations within the region. It may be, for example, that a $3,500 annual subscription agreement would be accepted just as readily as a $3,000 package by the high-potential academic market segment. Also, through the qualitative and quantitative analyses that are coupled with the concept and market testing it may be possible to identify additional market segments in the academic institution area or other areas, that could be offered a less comprehensive Annual Service Agreement for a lower cost. The $3,000 proposed package is not designed to differ in its appeal to large, research-oriented schools and small, non-research-oriented schools. Both frequency and intensity of activity regarding the requirements for technical assistance should be considered. The research-oriented school might be characterized by greater frequency of need, but at a generally lower level of intensity, since it should have more highly trained staff and faculty. The non-research-oriented school might be characterized by a less frequent but more intense need due to the lack of qualified staff assistance and faculty. Thus, it is the total of frequency and intensity, rather than one or the other, that must be the focal point of consideration.

It is estimated that 15 Annual Service Agreements should be sold during the second half of Phase 2. At $3,000 per agreement, the projected NASIC revenue is $45,000.

Development of the Specialized Seminar Series will probably mean that NASIC would need to acquire additional funds from outside sources. It is assumed in Exhibit VII-3 that NASIC would prepare a proposal to NSF or some other source to obtain the necessary funding. This proposal activity and the delay between its submission and receipt of funds is shown during the first half of Phase 2. The second half of Phase 2 for the Special Seminar Series track is then scheduled for actual program development. Thus, no revenue during Phase 2 is projected for the Specialized Seminar Series track.

In the case of the Research and Information Development Process track much less concept and market testing should be required. However, intensive strategy development should take place to begin to effect the required "organizational change" necessary to link the retrospective search service into the research proposal system, and to obtain and implement current-awareness requests. These activities are scheduled for the first half of Phase 2. It is projected in Exhibit VII-3 that 50 retrospective searches, at $25 net revenue each to NASIC, and 10 current-awareness services at $75 net revenue each, would be sold by NASIC. Thus, the total projected revenue from the Research and Information Development Process track during Phase 2 is $2,000.

Thus, the $45,000 from the Annual Service Agreement track, no revenue from the Specialized Seminar Series Track, and $2,000 from the Research and Information Development Process track would yield a total Phase 2 NASIC revenue of $47,000.

Phase 3--It is projected that by the end of Phase 3 an additional 20 Annual Service Agreements should have been generated. Thus, the total number of agreements by the end of Phase 3 should be 35, and the resulting revenue at $3,000 per agreement is projected to be $105,000. An anticipated 40 Special Seminar Series should be conducted during Phase 3. The resulting revenue at $500 per seminar would be $20,000. In addition, for the Research and Information Development Process track 175 retrospective searches at $25 each and 20 current-awareness services at $75 each are expected to be processed during Phase 3. This third track would yield revenue of $5,875. Thus, the total Phase 3 revenue, including all three tracks, is projected at $130,875, or about three times the amount yielded from Phase 2.

Phase 4--Another 15 institutions from the high-potential market segment are estimated to be added to the 35 from Phase 3. The total of 50 such institutions having an Annual Service Agreement with NASIC by the end of Phase 4 results in a projected revenue of $150,000 for that track. Twice the number of Specialized Seminars conducted is estimated for Phase 4. The total of 80 seminars would give a projected revenue of $40,000 for that track. By the end of Phase 4, it would be necessary for NASIC to be generating 3,080 retrospective searches ($25 net revenue each) and 440 current-awareness services (75 net revenue each) to provide $77,000 and $33,000 in revenue respectively. This implies that it would be necessary to process about 31 retrospective searches for each of 100 institutions, half of which do not have annual subscription agreements, and about 5 current-awareness services under the same conditions. The Phase 4 total NASIC revenues for all three tracks amount to $300,000.

3. Uses of Funds

The sources of NASIC revenue in regard to Phases 2, 3, and 4 by service-offering track have been presented without regard to the corresponding uses of funds (or costs). Since NASIC's survival will depend on a rapid buildup of revenues by the end of Phase 4, the heavy testing, developmental and marketing effort will necessitate corresponding costs for personnel, overhead, travel, and other items. The marketing program and operational costs for NASIC during Phases 2 and 3 are projected to be in excess of the anticipated revenue flow. It is assumed that the difference will be funded by NSF since the resulting NSF portion is well below the 80 percent level of current NSF funding. However, no NSF funding is anticipated for Phase 4, the critical milestone at which NASIC is expected to be self-sufficient in terms of generating revenues to correspond with the level of their marketing and operational costs. Since NASIC is to be non-profit, no profit considerations are included.

Concept and market testing, strategy development, and a marketing effort for each of the three service-offering tracks have implementation and operational costs associated with them. However, these costs are considered to be included in the itemized costs shown in Exhibit VII-4, Uses of Funds. This also includes the servicing of the Annual Service Agreements and conducting the Specialized Seminars. However, the funds required for the preparation of the Specialized Seminar Series are not included, since they are assumed to be obtained outside of NASIC. As

EXHIBIT VII-4

Uses of Funds

1. Salaries		
a. NASIC Headquarters		
- Program Director	$30,000/yr.	
- Information Science Librarian	18,000/yr.	
- Asst. Information Science Librarian	12,000/yr.	
- Secretary	8,000/yr.	
Subtotal	$68,000/yr.	
b. Marketing and Technical Representatives		
- Manager	$20,000/yr.	
- Senior 1	18,000/yr.	
- Senior 2	16,000/yr.	
- Senior 3	16,000/yr.	
Subtotal	$70,000/yr.	
Salaries Subtotal		$138,000/yr.
2. Benefits and Payroll Taxes (@ 20% of 1)		27,600
3. Overhead on Salaries (@ 50% of 1 plus 2)		82,800
		$248,400*
4. Travel ($3,000/mo. x 12 months)		36,000
5. Printing and Postage		5,000
6. Telephone ($500/mo. x 12 months)		6,000
7. Terminal and Modem Rental - two ($250/mo. x 12 months)		3,000
Grand Total		$298,400

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*(Salary increases are not included)

described before, the costs for the retrospective searches and the current-awareness services have been subtracted from the net price to the client; thus only the net revenue to NASIC is considered as revenue. The costs are not included in Exhibit VII-4, since they essentially flow through the transaction.

Exhibit VII-4 indicates NASIC activity at the level of using just under $300,000. This is itemized into salaries, benefits and payroll taxes (at 20 percent of salaries), overhead on salaries and benefits (at 50 percent), travel, printing and postage, telephone, and terminal rental (two time-sharing terminals with modems).

In comparing the sources of NASIC revenues to the uses of such funds, the premise is that revenues will increase from Phase 2 through Phase 4, while NSF funding will decrease during the same period, and marketing and operational costs will remain fairly constant during the same period.

Although the estimated revenue and cost amounts projected in Exhibits VII-3 and VII-4 are gross aggregates, highly assumptive, and a priori of additional testing, they still point out the necessity for proceeding on the basis of three service-offering tracks, and the conclusion that all three tracks need to be a part of the NASIC marketing program. Also, it is possible to use the figures presented as base figures for analysis and simulation of other outcomes from changes in the assumed variables. In summary, the financial analysis clearly indicates the level and direction of activity required.

VIII. SUMMARY OF FINDINGS AND RECOMMENDATIONS

In this summary, CSG's findings will first be presented alone; they will then be incorporated into the presentation of CSG's recommendations, which evolved from the findings.

A. Findings

1. The most sensitive and urgent topic that NASIC must deal with will be money. Three monetary problems will impinge on NASIC's income potential: the pricing of NASIC services (the absolute dollar amounts); the source of funding within each client institution; and the rationales used to buy NASIC services.

At present, computerized information services rank very low in the scheme of institutional priorities; such services must compete for scarce money with many other items. Academic representatives interviewed in the course of CSG's study voiced, almost universally, high sensitivity to the cost of information services. The interviewers generally concluded that prospective buyers are normally prepared to pay a price for searches that is considerably below prevailing rates (and, in some cases, actual costs). This is a function of both their naivete and their limited means.

In any event, it is clear that the revenues that NASIC could generate solely from serving as a broker for individual searches of computerized data bases will not enable it to recover its expenses. Hence, NASIC will have to offer other services as well, in order to raise enough revenues to support a viable and active operation.

2. The second major area for NASIC's concern must be the creation and shaping of client awareness. During the interviews, both research administrators and active reasearchers showed themselves almost totally unaware of computerized data bases in their major fields of interest. Librarians, predictably, were somewhat more knowledgeable, but only in a very general way. The low level of awareness among researchers results in a widespread lack of apparent interest.

That this lack of interest is at least partially symptomatic of their lack of awareness is borne out by the finding that in institutions that have schools of library science the situation is somewhat different. In such schools, the general levels of awareness, interest, and overall sophistication seem somewhat higher.

One result of the ingenuousness of the potential user population is that basic concepts that apply to bibliographic data bases are foreign. The applications of computerized information services (current awareness, retrospective searching, review support, etc.), must all be carefully explained and related to the clients' own needs.

3. Successful development of the academic market must be based on three factors: (a) grass-roots pressure from potential users; (b) a sympathetic research administration; and (c) a positively-motivated, competent library staff. No one or two of these will suffice; all are important.

4. CSG's study suggests strongly that NASIC's market possibilities will be limited to services derived from bibliographic data bases, offered to selected academic institutions. There is no significant interest in bibliographic services among government agencies; interest in such services among non-profit institutions is very limited. There may be a demand for such services within the commercial sector, but this remains to be seen.

Even within the academic market, interest in such services, and ability to pay for them, will probably be limited to a relatively small percentage of the total number of schools in the Northeast.

5. The sale of census-data services does not appear to be an attractive marketing venture for NASIC. This applies to the academic, non-profit, state and local government markets, and probably to the industrial and commercial markets as well. The principal reason for this conclusion is the large number of sources for census data already available, many of which provide the information free, or at nominal charge. A possible exception to this negative conclusion concerns the development of seminars or workshops based on the use of census data.

Within the industrial and commercial market, certain retail organizations, such as banks, chain stores, fast-food operations, and gasoline retailers, which are headquartered in the ten-state area, may represent a possible market for census-data services; however, this market remains to be examined.

B. Recommendations

1. NASIC should concentrate on providing services derivable from bibliographic data bases, and should try to market these services, at least initially, to large academic institutions with major interests in scientific research and graduate training. NASIC may also find it worthwhile to market its services to the state boards of education that govern state-financed colleges (these boards will probably offer the only means of reaching certain state schools).

State and local governments and non-profit institutions do not appear sufficiently promising to warrant any active marketing or service program. Within the industrial and commercial sectors, a market could very likely exist among firms which are actively engaged in research and development; however, this market remains to be examined.

2. NASIC's marketing strategy must include ample provision for the general education of the prospective buying community. For NASIC to develop whatever market may exist with any rapidity at all, its educational activities must be highly intensive. Administrators, researchers, and librarians must be made aware of the existence of data bases, of their utility, and of the realities of the costs associated with their use.

3. To develop the academic market, a three-pronged approach will have to be made to each institution: NASIC should approach the library, the research administration, and the research staff. CSG's study suggests that no useful generalizations can be made as to who in an academic institution is likely to be most

interested or influential in the use of bibliographic data services. However, it was observed that the basic interviewing strategy used in the study would itself be a most productive means of assessing the interest and "responsibility structure" of a given campus. CSG recommends that NASIC's initial contact with a given university take the form of a general exploratory survey, using an interview instrument similar to those employed during this study. Based on the results of this initial assessment, further one-to-one contacts can then take place between NASIC staff and members of the university organization, as appropriate to the particular situation. CSG also recommends that NASIC develop and maintain a basic profile of pertinent information and data on every major academic institutional prospect.

4. In addition to its general educational function, NASIC's marketing strategy should be developed around the three services described in Chapter VII: the Annual Service Agreement, the Specialized Seminar Series, and the Research and Information Development Process. Its ultimate objective in marketing all of these services should be the inclusion of NASIC services as regular line items in the budgets of the client institutions.

APPENDIX A--RESEARCH METHODOLOGY

The development of any research methodology involves a creative planning process. The researchers develop a viable methodology for a given study by reconciling project objectives, sample design alternatives, staff availability and capability, and time and budget limitations. This section summarizes the methodology that CSG developed for the market study that has been described in this report.

A. Sample Design

The non-probability or purposive processes used in selecting sample units incorporated the experience and judgment of the CSG study team and NASIC personnel. Thus, the research team believes that the sample design for this study: (1) included institutions exhibiting a variety of organizational characteristics in each of the three markets studied; (2) represented an efficient and prudent use of the limited survey budget; and (c) produced a sample whose size was appropriate to the limited amount of time available for the study.

Because non-probability selection processes were used in the study design, the findings discussed in previous sections of this report should not be generalized beyond the institutions represented in the sample. However, the sample used in this study is illustrative of the types of organizational structure and general characteristics of the academic, state and local government, and non-profit research and development institutions found in the 10-state area.

1. The Academic Market Sample

To achieve the study objectives related to this market segment, a total of 36 academic institutions in the 10-state area covered by NASIC were chosen for survey interview. The salient characteristics of this sample design and interview process are summarized as follows:

a. The 36 institutions included in the sample represent a wide variety of academic organizational characteristics including (a) size (large and small), (b) location (urban and rural), (c) geographic dispersion (six of the ten states), and (d) source of funding (public and private).

b. Twelve of the institutions were surveyed through extensive on-campus interviews, while 24 institutions were approached by telephone. The 12 institutions which were surveyed through personal interviews included:

(1) Pennsylvania State University

(2) Syracuse University

(3) Cornell University

(4) Rensselaer Polytechnic Institute

(5) University of New Hampshire

(6) Dartmouth College

(7) University of Pennsylvania

(8) Boston University

(9) Columbia University

(10) Tufts University

(11) University of Bridgeport

(12) Glassboro State College

Interviews were completed with representatives of 19 of the 24 institutions that were approached by telephone. The 19 schools successfully surveyed included:

(1) Lowell Technological Institute

(2) Carnegie-Mellon University

(3) Franklin and Marshall College

(4) Worcester Polytechnic Institute

(5) Brown University

(6) Wesleyan University

(7) University of Massachusetts (Amherst)

(8) Drexel University

(9) University of Rochester

(10) SUNY - Plattsburgh

(11) Yale University

(12) Fordham University

(13) Rochester Institute of Technology

(14) Colby College

(15) Temple University

(16) Colgate University

(17) Villanova University

(18) University of Vermont

(19) University of Delaware

In four schools, repeated attempts to reach various members of the faculty and administration failed to produce contact with anyone who could answer the questions contained in CSG's interview guide. Although messages were left asking the responsible parties to call CSG (at CSG's expense), no representative of these four institutions ever complied. The four schools were:

(1) University of Maine

(2) Rutgers University

(3) SUNY - Buffalo

(4) Boston College*

There was, finally, one exceptional case. CSG first attempted to assess research at CUNY's Graduate Division. Research there, it was learned, is limited in extent, and is almost exclusively in the humanities. There is a Research Foundation for the CUNY system, which oversees research activities at all of the CUNY campuses. The head of this Foundation, although cooperative, was entirely unable to answer the questions posed by CSG's interviewer, owing to the sheer size of the program he administers. He said that he would be happy to cooperate in the study, but would have to be queried by letter, to allow him time to research each of the study questions. By the time this had been established, such a solution could not produce results quickly enough to permit their inclusion in the present report. Should NASIC desire it, CSG can continue its assessment of CUNY after the term of the present contract, or can provide the information that would enable NASIC to do this itself.

c. The three organizational levels included in each of the on-campus interviews were:

(1) The dean or vice-president for institution-wide research.

(2) The directors of (1) the library and (2) the computer center.

(3) Individual academicians and researchers.

Interviews conducted with individuals at each of these levels made it possible for CSG to assess a variety of functional, organizational, attitudinal, and policy characteristics affecting the market potential for NASIC products and services.

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*Since initial compilation of this report, a representative of Boston College has contacted CSG, and explained the delay in the College's response. Because CSG had concluded its analysis of the academic sector, he was referred to NASIC.

2. The Governmental Unit Sample

The CSG study team conducted personal interviews in a total of ten governmental units--including three state government agencies and seven municipal governmental units. These ten units were chosen to represent eight of the ten states in the Northeast, and encompassed various size, geographical, operational, and jurisdictional characteristics.

The following governmental units composed the sample for this market segment:

a. State Government Units

(1) New Hampshire (Concord)
(2) New York (Albany)
(3) Delaware (Dover)

b. Municipal Government Units

(1) Syracuse, N.Y.
(2) Camden, N.J.
(3) Portland, Me.
(4) Providence, R.I.
(5) Fitchburg, Mass.
(6) Wilmington, Del.
(7) Pittsburgh, Pa.

3. The Non-Profit Institution Sample

The CSG study team selected a sample of 15 large, non-profit institutions representing a variety of research interests, funding patterns, organizational characteristics, and geographical locations within the 10-state region. The five units surveyed through personal interviews included:

a. Brookhaven National Laboratory
b. Worcester Foundation for Experimental Biology
c. Riverside Research Institute
d. University City Science Center
e. Worcester Area Chamber of Commerce

In addition, telephone interviews were conducted with the following 10 non-profit institutions:

a. Institute for Advanced Study
b. Health Research, Inc.
c. Hudson Institute
d. Jackson Laboratory
e. Lahey Clinic Foundation
f. Wistar Institute of Anatomy and Biology
g. Boyce Thompson Institute for Plant Research
h. Marine Biological Laboratory
i. New England Board of Higher Education
j. American Society for Testing and Materials

4. The Commercial Market

The final potential segment included in the study was the industrial and commercial market. Since this market is not of immediate concern, the sample design for this study did not include any interviews or case studies.

5. Summary

During the field-work phase of this study, CSG's study team conducted 27 face-to-face interviews (12 in the academic market, 10 in governmental units, and 5 in non-profit institutions). In addition, 34 telephone interviews were conducted (24 in 19 schools in the academic market, and 10 in the non-profit institution market).

In general, the interviewers were received by the respondents in a cordial and cooperative manner. All interviews were preceded by telephone calls which were used to establish formal appointments with potential respondents. Finally, a NASIC follow-up letter was mailed to each of the cooperating institutions.

B. The Interview Guides

The design of the survey instrument(s) for any research project is critical to the project's success.

1. Step 1: NASIC Goals and Objectives

The design of the instruments used in this study began with a careful explication of the study's objectives. To achieve this thorough understanding of the study objectives, CSG's Project Director met with NASIC personnel to:

a. Identify NASIC's objectives, together with any *a priori* limitations on NASIC's pursuit of them.

b. Specify the research questions to be answered by this study, and relate these to decisions that NASIC must make in order to efficiently pursue its objectives.

c. Specify the types of analysis that would be most useful to NASIC.

2. Step 2: Specification of Information Needed to Obtain Study Goals

The second step in designing the questionnaires required the translation of NASIC study objectives into detailed "information objectives." CSG's study team had to:

a. Specify the items of information to be included in each questionnaire.

b. Calculate the relative utility of structured versus unstructured questions in each of the instruments, and for each method of interview.

c. Ensure that ample allowance was made for the collection of relevant information regarding opinions and behavior.

3. Step 3: Questionnaire Design

The two steps described above focused on a thorough understanding of the study objectives, and on potentially useful measurement-scaling and questionnaire-construction technique. The next step was to actually design the questionnaires. The following questions illustrate the dimensions that CSG considered in developing the instruments for this study:

a. What balance should be achieved between structured and unstructured questions in terms of (1) budgetary provisions, (2) data analysis, and (3) interviewer/respondent burden?

b. What awareness, preference, and behavioral scales and/or questions are most suitable for this study?

c. What modifications and adjustments to the basic questionnaire are necessary to develop an efficient and effective telephone questionnaire?

d. What are the implications of the questionnaire formats for (1) interviewer error, (2) interviewer bias, and (3) analysis?

e. In each question, is the wording (1) ambiguous, (2) unfamiliar to respondents, or (3) too complicated or lengthy?

f. What features of the questionnaires dictate special attention in (1) interviewer training and (2) administration?

4. Step 4: Questionnaire Pretest

After the questionnaires for each of the three segments were developed, the study team used the first interview conducted by each of the interviewers as a pretest. The interviewers then met to review the questionnaires' strengths and weaknesses. In general, the instruments were believed to be satisfactory; as a result, no major modifications were made to the questionnaire forms found in Attachment A. It was found in the pretest, however, and confirmed subsequently, that the questionnaires worked best when they were used to guide the interviews, rather than to precisely dictate the conduct of each conversation (this had been anticipated when the questionnaires were designed). The method of administration, therefore, involved a relatively unstructured conversation, in the course of which the interviewers were careful to cover all relevant items included in the questionnaire. The questionnaire protocols were then used to record the information elicited during the interviews. The interviewers felt that this method of presentation was more congenial for the respondents than a straight question-and-answer session would have been.

5. Summary

In summary, the questionnaire design established the crucial link between NASIC objectives and the study's results.

The design process, therefore, focused first on a thorough understanding of the research questions to be answered through this study. CSG then developed information objectives and applied the art of questionnaire construction to these objectives. Finally, the instruments were pretested and evaluated after the initial interviews in each of the three segments.

C. Interviewer Selection and Training

For the interviewing itself, CSG utilized two regular members of its professional staff (Jon L. Spargur and John M. Strawhorn) and two Adjunct Associates (Professors Paul R. Dommel and Philip G. Kuehl). Each of these individuals possessed appropriate academic credentials and adequate knowledge of the subject area and respondent group to function effectively during data collection. In addition, all four had previous interviewing experience.

To orient the interviewers, the Project Director supervised the study team in:

- The development of written summaries of (1) data base terminology and concepts, (2) available data bases in selected subject disciplines, and (c) census data base products and services. These materials were read and studied by the interviewers and discussed during meetings of the entire study team (copies of these materials are included in Attachment B).
- The in-depth discussion of the questionnaires--including the highlighting of "skip patterns," use of open-ended questions, etc.
- The conduct and assessment of "practice interviews."
- The conduct and assessment of the pretest interviews.

D. Data Analysis

As has been stated, this study emphasized a "qualitative" analysis of the data collected during the interview, rather than the development of generalizable "hard" data. The research team--individually and through group discussions--attempted to identify and describe the characteristics of the several markets that will determine their interest in NASIC's services, and their ability to pay for them. The results of the data analysis are found in the preceding sections of this report.

E. Summary

This appendix has described CSG's sample design, questionnaire construction, interviewer selection and training, and data analysis. The study findings and their impact should be assessed in terms of the research methodology here described.

UNIVERSITY RESEARCH ADMINISTRATION
SURVEY

ADMINISTRATIVE DATA:

1. Institution: ____________________

2. Interviewer: ____________________

3. Time Interview Began: ________ A.M. P.M.

Date: ________

Time Interview Ended: ________ A.M. P.M.

Capital Systems Group, Inc.
6110 Executive Boulevard
Rockville, Maryland 20852

I CLASSIFICATION DATA

A. Dean for Research

1. Name: ______________________________

2. Title: ______________________________

3. Address: ______________________________

____

____

____

4. Telephone: (   ) ______________________

B. Person Interviewed (☐ SAME)

1. Name: ______________________________

2. Title: ______________________________

3. Address: ______________________________

____

____

____

4. Telephone: (   ) ______________________

C. Documentation

1. Annual reports, summaries, etc: ☐ Obtained

Available: ______________

____

____

____

2. Other Documentation: ______________________________

(☐ NONE) ______________________________

____

____

3. No Documentation ☐

II. ORGANIZATIONAL STRUCTURE FOR RESEARCH

(☐ Explained in Documentation)

1. What are the basic organizational units and functions which comprise the "office of research" on-campus? *(Probe as required)*

	Organizational Unit	Director, etc.	Major Function
a.			
b.			
c.			
d.			
e.			

2. Are any institutes, foundations, or other R&D organizations involved in the research effort on this campus?

☐ No

☐ Don't know (Contact: ______________________________

____

____

☐ Yes

(Complete table and go to Q.4)

	Organizational Unit	Director etc.	Major Function	Subject Areas
a.				
b.				
c.				
d.				
e.				

3. Does this mean that virtually all research is brought on the campus through regular academic units (college level, department level, etc.) and this office?

☐ Don't know (Contact: ______________________________

____

______________________________)

☐ YES

☐ NO

(Probe as required)

↓

____

____

____

____

4. How is the library represented in the "organizational structure for research" on the campus? (☐ Don't know)

____

____

____

____

5. How is the computer center related to the on-campus research effort? (☐ Don't know)

____

____

____

____

____

III. DATA BASE PENETRATION

1. Have any academic units on the campus developed automated, computerized data bases?

☐ No

☐ Don't know (Contact: ______________________

____

______________________)

☐ Yes

	Organizational Unit	Director etc.	Name of Data Base	Subject Area
a.				
b.				
c.				
d.				
e.				

2. Are any academic units on the campus expending grant or contract funds -- from any source -- for the acquisition and use of information services, especially automated data bases (either bibliographic or census type)?

☐ No

☐ Don't know (Contact: ______________________

____

______________________)

☐ Yes

	Organizational Unit	Director etc.	Name of Data Base	Biblio? Census?	Subject Area
a.					
b.					
c.					
d.					
e.					

3. What (other) academic units on the campus have investigated using automated or computerized data bases of any type (either bibliographic or census type)?

☐ No

☐ Don't know (Contact: ______________________

____

______________________)

☐ Yes

	Organizational Unit	Director etc.	Name of Data Base	Biblio? Census?	Subject Area
a.					
b.					
c.					
d.					
e.					

4. What (other) academic units on the campus are the most likely candidates for automated data base use in the future (either bibliographic or census type)?

☐ No

☐ Don't know (Contact: ______________________

____

______________________)

☐ Yes

	Organizational Unit	Director etc.	Name of Data Base	Biblio? Census?	Subject Area
a.					
b.					
c.					
d					
e.					

IV. DATA BASE POLICY ISSUES

1. Are campus wide funds available for automated data base subscriptions -- funds in addition to funded research?

   ☐ Don't know (Contact: ______________________

   ____

   ______________________)

   ☐ No

   ☐ Yes *(Probe as required and go to Q.3)*

   a. Who has the responsibility for the budgeting process associated with these funds? (☐ Don't know)

   ____

   ____

   ____

   ____

   b. What administrative processes would be required for the principal investigator on a research project to use such funds to subscribe to an information service? How long would such a process take? (☐ Don't know)

   ____

   ____

   ____

   ____

2. What potential is there that this institution might subscribe, as a whole, to computerized information services -- which would then be made available to all researchers on the campus?

   a. Why or why not? ______________________

   ____

   ____

   ____

b. Where would the funding come from?

c. Who would administer such a program?

3. What role, if any does the university library fulfill in assisting on-campus researchers to obtain or gain access to computerized data bases? (☐ Don't know)

4. What about the computer science center on campus? Does this unit assist researchers to obtain or gain access to computerized data bases? (☐ Don't know)

5. Would the (a) library or some other organization on the campus or (b) individual researchers have to assume an active role if computerized data were to be more widely available to researchers on this campus? (☐ Don't know)

a. Library (Why: ______________________________

____

____

______________________________)

b. Some other organizational unit (Why: __________

____

____

____

____

c. What role would you foresee the office of research playing if computerized data bases were to be more widely available to researchers on the campus? (☐ Don't know) ____________

____

____

____

____

V. OPINIONS

1. What, in your opinion, is the major obstacle to the wider use and acceptance of computerized (a) bibliographic, or (b) census data bases by researchers on this campus? (☐ Don't know)

a. Computerized bibliographies: ________________

____

____

b. Census data bases: __________________________

____

____

2. Do you foresee any wide use of U.S. census data bases by researchers on this campus? *(Probe as required -- obtain specific opinions)*

____

____

____

____

3. Have, to your knowledge, computer data base proprietors attempted to market their products on campus through (a) this office, (b) the library, or (c) the computer science center? (☐ Don't know)

____

____

____

____

VI. INTERVIEW SCHEDULE SUMMARY

A. Users and Potential Users

	Name	Academic Unit	Subject Area
a.			
b.			
c.			
d.			
e.			
f.			
g.			

B. Other Key Access Points

1. Library

   a. ________________________________

   b. ________________________________

   c. ________________________________

2. Computer Center

   a. ________________________________

   b. ________________________________

   c. ________________________________

3. Institutes, etc.

   a. ________________________________

   b. ________________________________

   c. ________________________________

VII. KEY INTERVIEW SUMMARY

UNIVERSITY LIBRARY OR INFORMATION CENTER
SURVEY

ADMINISTRATIVE DATA:

1. Institution: ______________________

2. Interviewer: ______________________

3. Time Interview Began: ____________ A.M. P.M.

DATE: ________

Time Interview Ended: ____________ A.M. P.M.

Capital Systems Group, Inc.
6110 Executive Boulevard
Rockville, Maryland 20852

I. CLASSIFICATION DATA

A. Head Librarian

1. Name: ____________________

2. Address: ____________________

____

____

____

3. Telephone: (   ) ____________________

B. Person Interviewed (☐ SAME)

1. Name: ____________________

2. Address: ____________________

____

____

____

3. Telephone: (   ) ____________________

C. Documentation

1. Annual reports, summaries, etc. ☐ Obtained

Available: ____________________

____

____

2. Other Documentation: ____________________

(☐ None) ____________________

____

____

3. No Documentation ☐

D. General Characteristics of Library *(Probe as required)*

1. Volume of holdings: ______________________________

____

____

____

2. Sources of funding:

	$	%
a. Endowments		
b. Budget allocations		
c. Other		

3. Organization characteristics:

a. Centralized vs decentralized in terms of a:

1. physical location(s) -- ________________

____

2. decision-making -- ______________________

____

b. Relationship with computer science center:

____

____

____

c. Relationship with office of research: _____

____

____

____

d. Academic units most supported in terms of research activities by the library _________

____

____

____

e. Academic units least supported in terms of research activities by the library _______

____

____

____

4. How is the library represented in the "organizational structure for research" on the campus? (☐ Don't know)

____

____

____

____

5. How is the computer center related to the on-campus research effort? (☐ Don't know)

____

____

____

____

II. DATA BASE PENETRATION

1. Have any automated data bases been developed on campus?

☐ No

☐ Don't know (Contact: ________________________
____
________________________)

☐ Yes

(Complete table as required)

	NAME	ACADEMIC UNIT	DATA BASE	SUBJECT	AVAILABLE TO OUTSIDERS?
a.					
b.					
c.					
d.					
e.					

2. Are any computer data bases being used on the campus -- in addition to the one (these) you have just mentioned?

☐ No

☐ Don't know (Contact: ______________________________

____

______________________________)

☐ Yes

(Complete table as required)

	NAME	ACADEMIC UNIT	DATA BASE	SUBJECT
a.				
b.				
c.				
d.				
e.				

3. To your knowledge, have U.S. census data bases ever been used by researchers on this campus?

☐ No

☐ Don't know (Contact: ______________________

____

______________________)

☐ Yes

(Complete table as required)

	NAME	ACADEMIC UNIT	SPECIFIC SERVICE	SUBJECT
a.				
b.				
c.				
d.				
e.				

4. Is the professional library staff familiar with the various data bases which could be used by researchers on this campus?

☐ No

☐ Don't know (Contact: ______________________

____

______________________)

☐ Yes

Which ones?

a.	f.
b.	g.
c.	h.
d.	i.
e.	j.

5. Have any members of the professional library staff ever used automated data bases?

☐ No *(Go to Section III)*

☐ Don't know (Contact: ____________________

____

____________________)

☐ Yes

5-1. Which ones?

a.	f.
b.	g.
c.	h.
d.	i.
e.	j.

5-2. Are these staff members trained in the structuring of computer searches of bibliographic data bases?

☐ Yes

☐ No *(Go to 5-5)*

☐ Don't know

Remarks: ____________________

____

____

5-3. Does the library staff frequently perform searches for others on the campus?

☐ Yes

☐ No

☐ Don't know

Remarks: ____________________

____

____

5-4. Are these searches performed primarily for --
(check as many as apply and rank order)

___	Rank Order
Faculty	___
Graduate Students	___
Undergraduate Students	___
Administrators	___
Others (specify: ___	___
___)	

5-5. Does the library staff offer any training to --

	YES	NO	DON'T KNOW
(a) Faculty	___	___	___
(b) Graduate Students	___	___	___
(c) Undergraduate students	___	___	___
(d) Administrators	___	___	___
(e) Others (specify:	___	___	___
___			
___)			

-- in the use of automated data bases?

5-6. *For any "yes" in 5-5* Describe such training:

___

___

___

___

III. OPINIONS

1. What, in your opinion, is the major obstacle to the wider use and acceptance of (a) computerized bibliographic or (b) census data bases by researchers on this campus?

   (☐ Don't know)

   a. Computerized bibliographic: ____________________

   ____

   ____

   b. Census data bases: ____________________

   ____

   ____

2. Do you foresee any wide use of U.S. census data bases by researchers on this campus? *(Probe as required -- obtain specific opinions)*

   ____

   ____

   ____

3. Would the (a) library or some other organization on the campus or (b) individual researchers have to assume an active role if computerized data were to be more widely available to researchers on this campus? (☐ Don't know)

   a. Library (Why: ____________________

   ____

   ____

   ____________________)

   b. Some other organizational unit: (Why: ____

   ____

   ____

   ____________________)

c. What role would you foresee the office of research playing if computerized data bases were to be more widely available to researchers on this campus? (☐ Don't know) ____________________

____

____

____

4. Have, to your knowledge, computer data base proprietors attempted to market their products on campus through (a) the library, (b) the computer science center, or (c) any other organizational unit on the campus? (☐ Don't know)

____

____

____

____

5. What role, if any, does this library fulfill in assisting on-campus researchers to obtain or gain access to computerized data bases? (☐ Don't know)

____

____

____

____

6. What about the computer science center on campus? Does this unit assist researchers to obtain or gain access to computerized data bases? (☐ Don't know)

____

____

____

____

7. Are campus wide funds available for automated data base subscriptions -- funds in addition to funded research?

☐ Don't know (Contact: ______________________

____

______________________)

☐ No

☐ Yes

a. Who has the responsibility for the budgeting process associated with these funds?
(☐ Don't know)

____

____

____

____

b. What administrative process would be required for the principal investigator on a research project to use such funds to subscribe to an information service? How long would such a process take? (☐ Don't know)

____

____

____

____

8. What potential is there that this institution might subscribe, as a whole, to computerized information services -- which would then be made available to all researchers on the campus?

a. Why or why not? ______________________

____

____

____

____

b. Where would the funding come from? ______________

____

____

____

____

c. Who would administer such a program? ____________

____

____

____

____

9. Does the library provide information services to any off-campus users?

☐ No

☐ Yes Who are the users, and what services are offered?

____

____

____

____

IV. KEY INTERVIEW SUMMARY

Appendix A, Attachment A-3

UNIVERSITY COMPUTER CENTER

SURVEY

ADMINISTRATIVE DATA:

1. Institution: ______________________________
2. Interviewer: ______________________________
3. Time Interview Began: ____________ A.M. / P.M. Date: ____________
4. Time Interview Ended: ____________ A.M. / P.M.

Capital Systems Group, Inc.
6110 Executive Boulevard
Rockville, Maryland 20852

I. CLASSIFICATION DATA

A. Director

1. Name: ______________________________
2. Address: ______________________________

____

____

3. Telephone: (   ) ______________________________

B. Person Interviewed (☐ Same)

1. Name: ______________________________
2. Address: ______________________________

____

____

3. Telephone: (   ) ______________________________

C. Documentation

1. Annual reports, summaries, etc. ☐ Obtained

Available: ______________

____

____

2. Other Documentation: ______________________________

(☐ None) ______________________________

____

____

3. No Documentation ☐

D. General Characteristics of Library *(Probe as required)*

1. Nature of hardware availability: ________________

2. Nature of software availability: ________________

3. Organizational characteristics:

    a. Relationship with office of research: _______

    b. Relationship with campus library: __________

    c. Academic units most supported in terms of research by the computer center: ___________

    d. Academic units least supported in terms of research by the computer center: ___________

4. How is the computer center related to the on-campus research effort? (☐ Don't know)

____

____

____

____

5. How is the library related to the on-campus research effort? (☐ Don't know)

____

____

____

____

II. DATA BASE PENETRATION

1. Have any computerized, bibliographic data bases or census data bases been processed on campus?

☐ No

☐ Don't know (Contact: ______________________
____
______________________)

☐ Yes

(Complete table as required)

	NAME	ACADEMIC UNIT	DATA BASE	BIBLIO? CENSUS?	CONTACT	SUBJECT	PRESENTLY BEING USED?
a.							
b.							
c.							
d.							
e.							

2. What about specialized data bases which may have been developed on campus? Have any of these been processed through the computer center?

☐ No

☐ Don't know (Contact: ______________________________
____
______________________________)

☐ Yes

(Complete table as required)

NAME	ACADEMIC UNIT	DATA BASE	BIBLIO? CENSUS?	CONTACT	SUBJECT	PRESENTLY BEING USED?
a.						
b.						
c.						
d.						
e.						

3. Are any computer center staff members familiar with computerized data bases?

☐ No *(Go to Q.4)*

☐ Don't know (Contact: ______________________________
____
______________________________)

☐ Yes

3-1. In what subject areas?

a.
b.
c.
d.
e.
f.
g.
h.
i.
j.

3-2. Can these staff members develop and execute search strategies? ______________________

____

____

____

4. To your knowledge, have U.S. Census data bases ever been used by researchers on this campus?

☐ No

☐ Don't know (Contact: ____________________

____

____________________)

☐ Yes

(Complete table as required)

NAME	ACADEMIC UNIT	SPECIFIC SERVICES	SUBJECT
a.			
b.			
c.			
d.			
e.			

5. What role, if any, does the computer center fulfill in assisting on-campus researchers to obtain or gain access to computerized data bases?
(☐ Don't know)

____

____

____

____

6. What about the university library? Does this unit assist researchers to obtain or gain access to computerized data bases? (☐ Don't know)

7. Would the (a) computer center or some other organization on the campus or (b) individual researchers have to assume an active role if computerized data were to be more widely available to researchers on this campus? (☐ Don't know)

   a. Computer Center (Why: ____________________)

   b. Some other organizational unit (Why: ____________________

   c. What role would you foresee the office of research playing if computerized data bases were to be more widely available to researchers on the campus? (☐ Don't know)

III. OPINIONS

1. What, in your opinion, is the major obstacle to the wider use and acceptance of (a) computerized bibliographic or (b) census data bases by researchers on this campus? (☐ Don't know)

   a. Computerized bibliographies: ____________________

   ____

   ____

   ____

   b. Census data bases: ____________________

   ____

   ____

   ____

2. Do you foresee any wide use of U.S. Census data bases by researchers on this campus? *(Probe as required -- obtain specific opinions)*

   ____

   ____

   ____

   ____

3. Have, to your knowledge, computer data-base proprietors attempted to market their products on campus through (a) this computer center, (b) the library, or (c) office of research? (☐ Don't know)

   ____

   ____

   ____

   ____

4. Are funds available -- within the computer center or on a campus wide basis -- for data base subscriptions (in addition to funded research)?

☐ No

☐ Yes Who has responsibility for such funding? ____________________

____

____

____

5. What potential is there that this institution might subscribe, as a whole, to computerized information services -- which would then be available to all researchers on the campus?

a. Why or why not? ____________________

____

____

____

b. Who would make such decisions? ____________________

____

____

____

c. Where would the funding come from? ____________________

____

____

____

d. Who would administer such a program? ____________________

____

____

____

6. Does the computer center provide services to any off-campus users?

☐ NO

☐ Yes Who are the users, and what services are offered?

____

____

____

____

IV. KEY INTERVIEW SUMMARY

UNIVERSITY RESEARCH STAFF
SURVEY

ADMINISTRATIVE DATA:

1. Institution: ____________________
2. Interviewer: ____________________
3. Time Interview Began: ____________ A.M. P.M.
4. Time Interview Ended: ____________ A.M. P.M.

Date: __________

Capital Systems Group, Inc.
6110 Executive Boulevard
Rockville, Maryland 20852

I. CLASSIFICATION DATA

1. Project Title: ______________________________

____

____

2. Contract/Grant Number: ______________________

3. Principal Description Topics: ________________

____

4. Principal Investigator: ______________________

a. Affiliation: ______________________________

b. Telephone: (   ) __________________________

c. Address: __________________________________

____

____

5. Person Interviewed: __________________________

(☐ Same)

a. Affiliation: ______________________________

b. Telephone: (   ) __________________________

c. Address: __________________________________

____

____

6. Source of Funding: ___________________________

____

7. Amount of Funding: ____________ 8. Effective Dates: ________

____________ ________

8. Proposal, progress reports, etc.: ☐ Obtained

Available: __________

____

____

9. Other Documentation: __________

(☐ None) __________

____

10. Project End-Products: __________

____

____

____

11. Anticipated Future Research (including subject, prospective sponsor, etc.

(☐ None)

a. Related Area: __________

____

____

____

b. Unrelated Areas: __________

____

____

____

12. Other Present Research: (☐ None)

	Project Title	Contract Grant #	PI	Source of Funding	Amount of Funding	Date
a.						
b.						
c.						

II. DATA BASE PENETRATION

1. Generally speaking, do researchers in your field relate the use of automated or computerized data bases to the conduct of their research activities? (☐ Don't know)

2. What about U.S. Census data tapes? Do researchers in your field relate the use of these types of tapes to the conduct of their research activities? (☐ Don't know)

3. What, if any, are the names of the data bases which are used by researchers in your field? (☐ Don't know)

a.
b.
c.
d.
e.
f.
g.
h.
i.
j.

4. Have any of these data bases been used by researchers on this campus -- other than yourself?

☐ No
☐ Don't know
☐ Yes

Remarks: ____________

(Complete table as required)

	NAME	DATA BASE	ACADEMIC UNIT	SUBJECT OF PROJECT
a.				
b.				
c.				
d.				
e.				
f.				

5. In the conduct of your own funded research -- on projects other than the present study -- have you ever used any computerized, bibliographic data bases?

☐ Yes *(Go to Q.6)*
☐ Don't know
No

Remarks: ____________________
____
____

5-1. Why not? For instance, were various data bases related to your topic unavailable?

☐ Yes *Go to Q.8)*
☐ Don't know *(Go to Q.5-3)*
☐ No

Remarks: ____________________
____
____

5-2. What were the names of some of the data bases you could have used in these previous studies?

	SUBJECT OF PROJECT	DATA BASE	DATES	SOURCE OF FUNDING	AMOUNT
a.					
b.					
c.					
d.					
e.					

TABLE #1

Project Title or Subject	Data Base Used	Sponsor of Project	Amount $	Dates	Location	Specific Services Used	Overall Satisfaction				Source: Direct or Intermediary
							High	Med	Low	Why?	

5-3. What were some other reasons for not using any computerized, bibliographic data bases in your previous research? ______________________

____

____

____

6. What are the names of the data bases you have used on previous research (other than your present study)?

(1)
(2)
(3)
(4)
(5)
(6)
(7)
(8)
(9)
(10)

7. *Complete Table 1 as required.*

8. When the proposal for this project was being written, was any consideration given to incorporating automated information services or data bases into the proposal?

☐ Yes
☐ No
☐ Don't know

Remarks: ____________________

____

____

8-1. *Probe:.* Why or why not? ______________________

____

____

____

____

8-2. What are the names of the available data bases -- which are related to this study -- that were considered for use in this study?

	Data Base	Considered-- Not Used?	Why?	Considered-- Used?	Why?
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

9. *(Complete Table 2 as required.)*

10. Are you aware of any data bases which have been generated within your institution?

☐ No

☐ Don't know

☐ Yes

(Complete Table as required.)

	Name	Data Base	Academic Unit	Subject or Project	Duplication of Materials	Offered to Outsiders?
a.						
b.						
c.						
d.						
e.						

TABLE #2

Project Title or Subject	Data Base Used	Sponsor of Project	Amount $	Dates	Location	Specific Services (Freq. Usage)	Overall Satisfaction				Source: Direct or Intermediary
							High	Med	Low	Why? Best/Worst Aspect	

11. Do you know of anybody else -- on or off campus -- using computerized data bases?

☐ No

☐ Don't know

☐ Yes

(Complete table as required)

	Name	Data Base	Location	Contact	Subject of Project
a.					
b.					
c.					
d.					
e.					

III. OPINIONS

1. What role, if any, does the university library fulfill in assisting researchers to obtain or gain access to computerized data bases? (☐ Don't know)

____

____

____

____

2. What about the computer center on campus? Does this unit assist researchers like yourself to obtain or gain access to computerized data bases? (☐ Don't know)

____

____

____

____

3. Do you know if campus wide funds are available for automated data base subscriptions -- funds in addition to funded research?

☐ Don't know (Contact: ____________________

____

____________________)

☐ No

☐ Yes *(Probe as required and go to Q.3)*

a. Who has the responsibility for the budgeting process associated with these funds? (☐ Don't know)

____

____

____

____

b. What administrative processes would be required for the principal investigator on a research project to use such funds to subscribe to an information service? How long would such a process take? (☐ Don't know)

____

____

____

____

4. What, in your opinion, is the major obstacle to the wider use and acceptance of (a) computerized bibliographic or (b) census data bases by researchers on this campus? (☐ Don't know)

a. Computerized bibliographies: ________________

____

____

b. Census data bases: __________________________

____

____

5. Do you foresee any wide use of U.S. Census data bases by researchers on this campus?
(☐ Don't know)

____

____

____

____

6. Would the (a) library or some other organization on the campus or (b) individual researchers have to assume an active role if computerized data were to be more widely available to researchers on this campus? (☐ Don't know)

____

____

____

____

7. Have, to your knowledge, computer data base proprietors attempted to market their products on campus through (a) this office, (b) the library, or (c) the computer science center?
(☐ Don't know)

____

____

____

____

IV. KEY INTERVIEW SUMMARY

V. DATA BASE AWARENESS SUMMARY

Organization and Data Base	Relevant			Unaware			Aware		
	Yes	No	DK	H	Me	L	H	Me	L

Other Data Bases

____

____

____

____

RESPONDENT DISPLAY
ORGANIZATION AND DATA BASE(S)

AMERICAN CHEMICAL SOCIETY

- Patent Concordance in Computer-Readable Form
- CA Integrated Subject File
- Polymer Science & Technology
- Chemical-Biological Activities (CBAC)
- CA Condensates
- Chemical Titles
- Chemical Abstracts Service Source Index

AMERICAN GEOLOGICAL INSTITUTE

- Geo-Ref (Geological Reference File)

AMERICAN INSTITUTE OF PHYSICS

- SPIN (Searchable Physics Information Notices)

AMERICAN MATHEMATICAL SOCIETY

- Mathematics of Computation, Volumes 1-23
- Mathematical Reviews 5-year Index, 1965-1969
- Mathematical Title Service/Index of Mathematical Papers
- Mathematical Title Service, Monthly Coverage

AMERICAN PSYCHOLOGICAL ASSOCIATION

- Psychological Abstracts

AMERICAN SOCIETY FOR METALS

- METADEX (Metals Abstracts Index)

AMERICAN SOCIETY OF CIVIL ENGINEERS

ASCE Journal Abstracts

ATOMIC ENERGY COMMISSION

Nuclear Science Abstracts

BIOSCIENCES INFORMATION SERVICE OF BIOLOGICAL ABSTRACTS (BIOSIS)

Abstracts on Health Effects of Environmental Pollutants (HEEP)

BA Previews

BIORI (Tape version of Bioresearch Index)

Biological Abstracts

CCM INFORMATION CORPORATION

Transdex

PANDEX Current Index to Scientific and Technical Literature

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

PASCAL (50 separate data bases associated with Bulletin Signaletique)

ENGINEERING INDEX, INC.

COMPENDEX (Computerized Engineering Index)

CITE (Current Information Tapes for Engineers)

EXCERPTA MEDICA FOUNDATION

Excerpta Medica

W. R. GRACE & COMPANY

Computerized Information Retrieval System of the Gas Chromatography Literature

INSTITUTE FOR SCIENTIFIC INFORMATION

Index Chemicus Registry System (ICRS)

ISI Source Index Magnetic Tapes

Social Science Citation Index Data Base

ISI Source & Citation Magnetic Tapes

INSTITUTE OF TEXTILE TECHNOLOGY

Textile Technology Digest Keyterm Index

INSTITUTION OF ELECTRICAL ENGINEERS

INSPEC

MASS SPECTROMETRY DATA CENTRE

Mass Spectrometry Bulletin

NATIONAL INSTITUTE OF EDUCATION

RIE (Research in Education)

CIJE (Current Index to Journals in Education)

NATIONAL TECHNICAL INFORMATION SERVICE (NTIS)

Government Reports Announcements (GRA)

ROCK MECHANICS INFORMATION SERVICES

Rock Mechanics Information Services

SOCIOLOGICAL ABSTRACTS

Sociological Abstracts

WORLD MEETING INFORMATION CENTER, INC.

Current Programs

NON-PROFIT INSTITUTION SURVEY

ADMINISTRATIVE DATA:

1. Institution: ______________________________

2. Interviewer: ______________________________

3. Time Interview Began: ________ A.M. P.M.

Date: ____________

Time Interview Ended: ________ A.M. P.M.

Capital Systems Group, Inc.
6110 Executive Boulevard
Rockville, Maryland 20852

I CLASSIFICATION DATA

A. Director of Research

1. Name: ____________________
2. Title: ____________________
3. Address: ____________________
____
____
____
4. Telephone: (   ) ____________________

B. Person Interviewed (☐ SAME)

1. Name: ____________________
2. Title: ____________________
3. Address: ____________________
____
____
____
4. Telephone: (   ) ____________________

C. Documentation

1. Annual reports, summaries, etc: ☐ Obtained

Available: ____________
____
____
____

2. Other Documentation: ____________________
(☐ NONE) ____________________
____
____

3. No Documentation ☐

II. ORGANIZATIONAL STRUCTURE FOR RESEARCH

(☐ Explained in Documentation)

1. What are the basic organizational units and functions which encompass the scientific and technical research conducted by this institution? *(Probe as required)*

	Organizational Unit	Director, etc.	Major Function
a.			
b.			
c.			
d.			
e.			

2. How is the library represented in the "organizational structure for research" in this institution? (☐ Don't know)

____

____

____

____

3. How is the computer center or function related to the research effort of this institution? (☐ Don't know)

____

____

____

____

____

III. DATA BASE PENETRATION

1. Have any organizational units in this institution developed automated, computerized data bases?

☐ No

☐ Don't know (Contact: ________________________________

____

________________________________)

☐ Yes *(Probe as required)*

	Organizational Unit	Director etc.	Name of Data Base	Subject Area
a.				
b.				
c.				
d.				
e.				

2. Are any organizational units in this organization expending grant or contract funds -- from any source -- for the acquisition and use of information services, especially automated data bases (either bibliographic or census type)?

☐ No

☐ Don't know (Contact: ________________________________

____

________________________________)

☐ Yes *(Probe as required)*

	Organizational Unit	Director etc.	Name of Data Base	Biblio? Census?	Subject Area
a.					
b.					
c.					
d.					
e.					

3. What (other) organizational units in this institution have investigated using automated or computerized data bases of any type (either bibliographic or census)?

☐ None

☐ Don't know (Contact: ______________________

____

______________________)

☐ Yes

	Organizational Unit	Director etc.	Name of Data Base	Biblio? Census?	Subject Area
a.					
b.					
c.					
d.					
e.					

4. What (other) organizational units in this institution are the most likely candidates for automated data base use in the future (either bibliographic or census type)?

☐ None

☐ Don't know (Contact: ______________________

____

______________________)

☐ Yes

	Organizational Unit	Director etc.	Name of Data Base	Biblio? Census?	Subject Area
a.					
b.					
c.					
d.					
e.					

200

IV. DATA BASE POLICY ISSUES

1. Are general funds available within this institution for automated data base subscriptions -- funds in addition to funded research?

☐ Don't know (Contact: ______________________________

____

______________________________)

☐ No

☐ Yes *(Probe as required and go to Q.3)*

a. Who has the responsibility for the budgeting process associated with these funds?
(☐ Don't know)

____

____

____

____

b. What administrative processes would be required for the principal investigator on a research project to use such funds to subscribe to an information service? How long would such a process take?
(☐ Don't know)

____

____

____

____

2. What potential is there that this institution might subscribe, as a whole, to computerized information services -- which would then be made available to all researchers within the institution?

a. Why or why not? ______________________________

____

____

____

b. Where would the funding come from? ______________________________

____

____

____

____

c. Who would administer such a program? ______________________________

____

____

____

____

3. What role, if any, does the library fulfill in assisting researchers to obtain or gain access to computerized data bases? (☐ Don't know)

____

____

____

____

4. What about the computer center or function within this organization? Does this unit assist researchers to obtain or gain access to computerized data bases? (☐ Don't know)

____

____

____

____

5. Would the (a) library or some other organizational unit, or (b) individual researchers have to assume an active role if computerized data were to be more widely available to researchers in this organization? (☐ Don't know)

a. Library Why: ____________________

b. Some other organizational unit Why: ________

V. OPINIONS

1. What, in your opinion, is the major obstacle to the wider use and acceptance of computerized (a) bibliographic, or (b) census data bases by researchers in in this institution? (☐ Don't know)

   a. Computerized bibliographies: ________________

   b. Census data bases: ____________________

2. Do you foresee any wide use of U.S. census data bases by researchers in this organization? *(Probe as required -- obtain specific opinions)*

3. Have, to your knowledge, computer data base proprietors attempted to market their products to this institution through (a) this office, (b) the library, or (c) the computer science center? (☐ Don't know)

____

____

____

____

4. When research proposals are being written, is any consideration given to incorporating automated information services or data bases into the proposal? *(Probe as required)*

____

____

____

____

VI. KEY INTERVIEW SUMMARY

GOVERNMENT PLANNING UNIT

SURVEY

ADMINISTRATIVE DATA:

1. Government Unit: ______________________
2. Interviewer: ______________________
3. Time Interview Began: __________ A.M. P.M. DATE: __________
4. Time Interview Ended: __________ A.M. P.M.

Capital Systems Group, Inc.
6110 Executive Boulevard
Rockville, Maryland 20852

I. CLASSIFICATION DATA

A. Planning Director

1. Name: ______________________
2. Title: ______________________
3. Address: ______________________
____
____
4. Telephone: (   ) ______________________

B. Person Interviewed (☐ SAME)

1. Name: ______________________
2. Title: ______________________
3. Address: ______________________
____
____
4. Telephone: (   ) ______________________

C. Documentation

1. Annual reports, budget documents, etc. ☐ Obtained
Available: ______
______
______
______
2. Other Documentation: ______________________
(☐ NONE) ______________________
____
____
3. No Documentation ☐

II. PLANNING STRUCTURE

(☐ Explained in documentation)

A. Planning Structure

a. (   ) centralized in single planning unit

b. (   ) decentralized in functional line agencies

c. (   ) decentralized in regional planning units

____

____

____

B. Major Planning Units

	Unit	Function	Personnel
a.			
b.			
c.			
d.			
e.			

C. Responsibilities of Central Planning Office (if any)

a. (   ) Performs specific planning functions

Describe: ___________________________

____

____

b. (   ) Coordinates planning activities of line agencies

c. (   ) Has approval/disapproval authority over line unit planning

d. (   ) Reviews work of regional planning units

e. (   ) Other: ______________________________

____

____

D. Bureaucratic Location of Central Planning Office

a. (   ) Separate department of state (or local) government

b. (   ) Staff unit for governor, mayor, or city manager

c. (   ) Subunit of another department

d. (   ) Other: ________________________________

III. DATA BASE USES

A. Does this office use the U.S. Census Bureau data base?

a. (   ) YES

b. (   ) NO

B. If so, in which of the following forms?

a. (   ) Computer tapes

b. (   ) Computer printouts provided from other sources

c. (   ) Printed reports

C. Does this office have its own set of Census Bureau tapes?

a. (   ) YES

b. (   ) NO

c. (   ) DON'T KNOW

D. If not, from what governmental unit or outside source do you get your Census data information?

Unit or Service	Data Type	Terms	Terms (inter-agency agreement, contract, etc.)
a.			
b.			
c.			

E. What role, if any, does this office play in providing Census data service to other governmental agencies (state, local, or regional)?

	Unit	Frequency	Cost
a.			
b.			
c.			
d.			
e.			

F. What Census data is used most frequently by this office (by order of frequency; e.g., if general population data is used most frequently, mark "1" in parenthesis).

a. (   ) general population characteristics
b. (   ) Housing census
c. (   ) Census of agriculture
d. (   ) Census school district tapes
e. (   ) Census Employment Survey
f. (   ) Other: ______________________________

G. Do you use any computerized data bases in addition to the Census tapes? Specify type and location of the base. Government or non-government operated.

	Type	Location	Govt. or Non-govt.
a.			
b.			
c.			
d.			

H. Do you know of other existing data bases used by other government agencies?

	Type	Location
a.		
b.		
c.		
d.		
e.		

I. How would you judge your results in the use of computer data bases?

____

____

____

J. What major problems or barriers have you experienced or do you forsee in the use of computer data bases?

____

____

____

K. What types of data do you use frequently or have a need for that is not available on computer tapes that you feel would be helpful in carrying out your planning and program responsibilities?

____

____

____

____

L. What units of state, regional, or local government do you know that are engaged in R&D activities that might be interested in scientific and technical data services? (e.g., environmental research)

	Unit	Type	Contact
a.			
b.			
c.			
d.			
e.			

IV. UTILIZATION OF EXTERNAL DATA BANKS

A. What administrative or budgetary processes would be required for this office to subscribe to an external information service? Do you have contract authority to subscribe to profit and/or non-profit information services? Would you be required to put this out for competitive bid?

____

____

____

____

B. Does this office currently buy or contract for outside information services?

a. ( ) YES

b. ( ) NO

c. ( ) DON'T KNOW

Nature of such service: ________________________

____

____

C. If this office does not have such subscription or contract authority, who does have this authority?

____

____

D. What other units of state, regional, or local government do you think would most likely be interested in intermediary information services for Census Bureau data?

	Unit	Type	Contact
a.			
b.			
c.			
d.			

V. KEY INTERVIEW SUMMARY

SOME BASIC INFORMATION SCIENCE TERMS AND CONCEPTS

A data base is a file, or structured collection, of some particular kind of information. It may be in computer-readable (or automated, or computerized) form, or manual (searchable only by hand). A bibliographic data base is a collection of references (either citations with abstracts or other notations of some sort, or unadorned citations) to items of literature (journal articles, books, monographs, etc.). The collection may, or may not, have index terms associated with each reference.

A computerized bibliographic data base is generally stored on magnetic tape. The main reason for computerizing the data base is that the computer can be used to search through a very large collection of references, using relatively complicated search instructions, in a very short time.

The search strategy used to sort through a particular data base for any given user is a function of the indexing system used in the creation of the data base and the processing system under which it is run. Indexing uses either a controlled or uncontrolled vocabulary. Controlled-vocabulary indexing involves the use of some kind of indexing authority (such as a classification schedule, or a thesaurus), from which terms are applied to the individual references. In uncontrolled indexing (free-term indexing),or indexing with an uncontrolled vocabulary, keywords (informative words) may be extracted from the title, the body of the paper, or the abstract, or be freely assigned by the indexer. Or there may no formal index at all (in this case, the computer may be used to automatically generate an index consisting of every word in the entire data base). N.B.: you cannot, simply from the indexing approach used in the preparation of any particular data base, make any particular inference about the quality of retrieval that will be experienced by someone using it.

Most searching of bibliographic data bases will have one of two aims: retrospective search, or the maintenance of current awareness. These terms are more or less self-explanatory. The retrospective searcher typically wants to find every possible reference that may be relevant to a particular topic, so he will want to search the data base back to its origin (or at least back over a substantial period of time). The user who is interested in maintaining current awareness, on the other hand, is interested in finding new items that coincide with his ongoing interests--and nothing else. One kind of current awareness service is called SDI (for selective dissemination of information). In SDI, a profile is constructed of index terms that are expected to consistently identify items of interest to a given individual or group. Every time the data base is updated (has a batch of new references computerized), the new input is screened against the SDI profiles, to select new references of likely interest. These references are then sent to the user.

In the interviews we will conduct, it is unlikely that there will be many questions concerning indexing approaches, processing systems, tape formats, etc. There may, however, be comments on one or more of these from users of particular data bases (e.g., the user couldn't satisfactorily define his subject interest using the available index terms). The subject matter treated in each data base is much likelier to elicit questions. As far as actual or intended use is concerned, we sould regularly try to distinguish between retrospective searching and maintenance of current awareness, and relate each of these to the subject matter in which users are interested, frequency of use, and so forth.

RESPONDENT DISPLAY
ORGANIZATION AND DATA BASE(S)

AMERICAN CHEMICAL SOCIETY

- Patent Concordance in Computer-Readable Form
- CA Integrated Subject File
- Polymer Science & Technology
- Chemical-Biological Activities (CBAC)
- CA Condensates
- Chemical Titles
- Chemical Abstracts Service Source Index

AMERICAN GEOLOGICAL INSTITUTE

- Geo-Ref (Geological Reference File)

AMERICAN INSTITUTE OF PHYSICS

- SPIN (Searchable Physics Information Notices)

AMERICAN MATHEMATICAL SOCIETY

- Mathematics of Computation, Volumes 1-23
- Mathematical Reviews 5-year Index, 1965-1969
- Mathematical Title Service/Index of Mathematical Papers
- Mathematical Title Service, Monthly Coverage

AMERICAN PSYCHOLOGICAL ASSOCIATION

- Psychological Abstracts

AMERICAN SOCIETY FOR METALS

- METADEX (Metals Abstracts Index)

AMERICAN SOCIETY OF CIVIL ENGINEERS

ASCE Journal Abstracts

ATOMIC ENERGY COMMISSION

Nuclear Science Abstracts

BIOSCIENCES INFORMATION SERVICE OF BIOLOGICAL ABSTRACTS (BIOSIS)

Abstracts on Health Effects of Environmental Pollutants (HEEP)

BA Previews

BIORI (Tape version of Bioresearch Index)

Biological Abstracts

CCM INFORMATION CORPORATION

Transdex

PANDEX Current Index to Scientific and Technical Literature

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE

PASCAL (50 separate data bases associated with Bulletin Signaletique)

ENGINEERING INDEX, INC.

COMPENDEX (Computerized Engineering Index)

CITE (Current Information Tapes for Engineers)

EXCERPTA MEDICA FOUNDATION

Excerpta Medica

W. R. GRACE & COMPANY

Computerized Information Retrieval System of the Gas Chromatography Literature

INSTITUTE FOR SCIENTIFIC INFORMATION

Index Chemicus Registry System (ICRS)

ISI Source Index Magnetic Tapes

Social Science Citation Index Data Base

ISI Source & Citation Magnetic Tapes

INSTITUTE OF TEXTILE TECHNOLOGY

Textile Technology Digest Keyterm Index

INSTITUTION OF ELECTRICAL ENGINEERS

INSPEC

MASS SPECTROMETRY DATA CENTRE

Mass Spectrometry Bulletin

NATIONAL INSTITUTE OF EDUCATION

RIE (Research in Education)

CIJE (Current Index to Journals in Education)

NATIONAL TECHNICAL INFORMATION SERVICE (NTIS)

Government Reports Announcements (GRA)

ROCK MECHANICS INFORMATION SERVICES

Rock Mechanics Information Services

SOCIOLOGICAL ABSTRACTS

Sociological Abstracts

U. S. GEOLOGICAL SURVEY

GEO

Geophysical Abstracts

WORLD MEETINGS INFORMATION CENTER, INC.

Current Programs

V. DATA BASE AWARENESS SUMMARY

Organization and Data Base	Relevant			Unaware			Aware		
	Yes	No	DK	H	Me	L	H	Me	L

Other Data Bases

A UNITED STATES
DEPARTMENT OF
COMMERCE
PUBLICATION

Appendix A, Attachment B-3

THE 1970 CENSUS AND YOU

(COVER SHEET ONLY)

A general introduction to Census data

✓ Publications

✓ Maps

[illegible]

✓ Tapes

✓ Microfilm

U.S. DEPARTMENT
OF COMMERCE
Bureau of
the Census

APPENDIX B--PROFILE OF POTENTIALLY AVAILABLE BIBLIOGRAPHIC DATA BASES

The data bases listed in the following summary (Attachment A) were originally identified as being of potential interest to persons engaged in scientific research. The list was intentionally made comprehensive, to ensure that CSG's interviewers would be able to discuss data bases in all major fields of research for which they exist.

As it happened, however, awareness of information services in general was so low that the list was almost superfluous. Due to the nature and limited size of the group of researchers with whom the interviewers spoke, it is not yet possible to weight interest in the various data bases. (One result of this is that it is not now possible to say that certain of the data bases would be of no significant interest.)

It seems probable that interest would be greatest and most immediate in the data bases in chemistry, biology, and engineering. The great popularity of Current Contents suggests that there may be significant interest in large interdisciplinary current-awareness services.

All of the data bases included in Attachment A are commercially available; all are being used somewhere in the U.S. Although this does not guarantee their availability to NASIC, there should be no insurmountable problems in gaining access to data bases of wide interest.

DATA BASE SUMMARY

ORGANIZATION AND DATA BASE(S)

ABSTRACTED BUSINESS INFORMATION, INC.
INFORM - Monthly. Indexed abstracts of articles on business from nearly 300 journals. 11k items/yr.

AMERICAN CHEMICAL SOCIETY
Patent Concordance in Computer-Readable Form - Semi-annual. Correlates patents issued by different countries for same basic invention. 47k items/yr.
CA Integrated Subject File - Semi-annual. Consists of Volume Index entries to Chem Abstracts; entries refer to approximately 360k abstracts/yr.
Polymer Science & Technology - Biweekly. Abstracts on literature in macromolecular chemistry. 36k items/yr.
Chemical-Biological Activities (CBAC) - Biweekly. Interaction of chemicals with biological systems. 37k items/yr.
CA Condensates - Weekly. Citations with Keyword Index phrases from corresponding issues of Chem Abstracts. Chemistry & Chem engineering. 360k items/yr.
Chemical Titles - Biweekly. Current-awareness service reporting titles of selected papers from 450 journals. 112k titles/yr.
Chemical Abstracts Service Source Index - Quarterly. Citations and document-locating information for original source literature of chemistry and chemical engineering. 5,500 items/yr.

AMERICAN GEOLOGICAL INSTITUTE
Geo-Ref (Geological Reference File) - Monthly. Earth science lit. 40k items/yr.

AMERICAN INSTITUTE OF PHYSICS
SPIN (Searchable Physics Information Notices) - Monthly. Physics and astronomy. 30k items/yr.

AMERICAN MATHEMATICAL SOCIETY
Mathematics of Computation, Volumes 1-23 - Single issue. Citations for each item in M. of C. 5k items.
Mathematical Reviews 5-year Index, 1965-1969. Single issue. Citations for all items in MR. 80k items.
Mathematical Title Service/Index of Mathematical Papers - Semi-annual cumulation of MTS monthly coverage. 10-12k items/yr.
Mathematical Title Service, Monthly Coverage - Monthly. Articles in math. and related fields. 10-12k items/yr.

AMERICAN PSYCHOLOGICAL ASSOCIATION
Psychological Abstracts - Monthly, quarterly, semi-annual, or annual. Psychology and other behavioral sciences. 24k items/yr.

AMERICAN SOCIETY FOR METALS
METADEX (Metals Abstracts Index) - Monthly. Metallurgy. 25k items/yr.

AMERICAN SOCIETY OF CIVIL ENGINEERS
ASCE Publications Abstract - Bimonthly. No information on volume Citations extracted from ASCE journals.

ATOMIC ENERGY COMMISSION
Nuclear Science Abstracts - Semi-monthly. Internat'l lit. on nuclear science & technology. 65k items/yr.

BIOSCIENCES INFORMATION SERVICE OF BIOLOGICAL ABSTRACTS (BIOSIS)
Abstracts on Health Effects of Environmental Pollutants (HEEP) - Monthly. Contents self-explanatory. 12k items/yr.
BA Previews - 2 sections: Bio. Absts. semi-monthly, BioResearch Index monthly. All life sciences. 240k items/yr.
BIORI (Tape version of Bioresearch Index) - Monthly. Corresponds to printed copy, but is issued several weeks earlier. Does not duplicate Bio. Abstracts.
Biological Abstracts - Semi-monthly. Corresponds to printed BA. Emphasizes basic research; BIORI emphasizes applied research.

CCM INFORMATION CORPORATION
Transdex - Monthly. Bib. refs. to all translations of the U.S. Joint Publications Research Service. 30k items/yr.
PANDEX Current Index to Scientific and Technical Literature - Weekly. Interdisciplinary. 250k items/yr.

CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (France)
PASCAL (50 separate data bases associated with Bulletin Signaletique) - Monthly. Interdisciplinary. 500k items/yr.

ENGINEERING INDEX, INC.
COMPENDEX (Computerized Engineering Index) - Monthly. Computerized version of Eng. Index. Covers 3500 journals. 85k items/yr.
CITE (Current Information Tapes for Engineers) - Periodicity unknown. Applications technology in Plastics and Electronic/ Electrical Engineering from 300 journals.

EXCERPTA MEDICA FOUNDATION (Netherlands)
Excerpta Medica - Weekly. Biomedical. 250k items/yr.

W. R. GRACE & COMPANY
Computerized Information Retrieval System of the Gas Chromatography Literature - Periodicity uncertain. 2400 items/yr.

INSTITUTE FOR SCIENTIFIC INFORMATION
Index Chemicus Registry System (ICRS) - Monthly. Covers articles reporting new chem. compounds or reactions. 15k items/yr.
ISI Source Index Magnetic Tapes - Weekly. Interdisciplinary. 374k items/yr.
Social Science Citation Index Data Base - Weekly. Social sciences. 75k items/yr.
ISI Source & Citation Magnetic Tapes - Weekly. Interdisciplinary 374k items/yr.

INSTITUTE OF TEXTILE TECHNOLOGY
Textile Technology Digest Keyterm Index - Monthly. Textiles and related areas. 12k items/yr.

INSTITUTION OF ELECTRICAL ENGINEERS (U.K.)
INSPEC - Semi-monthly or monthly. Physics, electrical/electronics engineering, computers and control engineering. 150k items/yr.

MASS SPECTROMETRY DATA CENTRE (U.K.)
Mass Spectrometry Bulletin - Monthly. 7500 items/yr.

NATIONAL INSTITUTE OF EDUCATION
RIE (Research in Education) - Monthly, quarterly, or annual. Educational research. 12k items/yr.

CIJE (Current Index to Journals in Education) - Periodicity same as RIE. Indexes over 500 educational journals. 15k items/yr.

NATIONAL TECHNICAL INFORMATION SERVICE (NTIS)
Government Reports Announcements (GRA) - Semi-monthly. Multidisciplinary. 56k items/yr.

ROCK MECHANICS INFORMATION SERVICES
Rock Mechanics Information Services - Annual. Interdisciplinary. 2k items/yr.

SOCIOLOGICAL ABSTRACTS
Sociological Abstracts - Single file containing all of SA from 1965-present. 12k items/yr.

WORLD MEETINGS INFORMATION CENTER, INC.
Current Programs - Monthly. Scientific and technical meetings programs, including biomedical area. 1200 meeting programs; 120k papers/yr.

A SURVEY OF TIMESHARING COMPUTER SERVICE ORGANIZATIONS IN THE BOSTON AREA

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Abstract

A survey was made of fifteen companies in the Boston area which provide access to timesharing computers. Visits were made to each company and representatives were interviewed. Special emphasis was placed on evaluating the ability of these companies to support text management and information retrieval from large data bases. The procedures followed are described and the information gathered during these visits is summarized in this report.

1.0 INTRODUCTION

The New England Board of Higher Education (NEBHE) is a public service agency established in 1955 under the New England Higher Education Compact, and is organized and supported by the six New England states. One of NEBHE's purposes is to make maximum use of the region's higher education facilities through inter-institutional cooperation.

The Northeast Academic Science Information Center (NASIC) is being developed by NEBHE to provide the Northeast area with a central access point to the nation's growing and diverse information resources in computer-readable form. NASIC is supported by the National Science Foundation under Grant No. GN-37296 and is a Research Program of NSF's Office of Science Information Service.

The services which will be offered by this new information center will require considerable computer support. In some instances the necessary services are already available from other information centers across the country. In other cases, however, it may become necessary to import data, software, or both and maintain some services on a local computer facility. This survey attempts to set the groundwork for selection of a timesharing computer service in the local Boston area which could fill such a need.

2.0 OBJECTIVES OF THE SURVEY

It was determined that the primary objective of this investigation would be to seek out and document information pertaining to commercial timesharing computer "service bureaus" in the Boston area, the immediate vicinity of NASIC headquarters. That is, we were interested in organizations which sell computer time rather than prepackaged computer-based services. A complete and early understanding of these support possibilities already existing within New England insures that future conversations with information centers concerning importation of software can be conducted in a realistic framework. As a secondary objective, this investigation sought to uncover additional data retrieval activities being conducted commercially in New England. Special attention was paid to work being done with census tapes and any bibliographic data base.

It was hypothesized that these commercial services might be used by NASIC to supplement processing capabilities available at other locations in the region. It should be noted at the outset that the NERComP (New England Regional Computing Program) network offers facilities comparable to those of many commercial establishments at considerably lower rates than are provided by academic institutions, in many cases the same institutions which a NASIC center might eventually serve.

3.0 SCOPE OF SURVEY EFFORT

Close geographical proximity of the service organization or a branch office to NEBHE was considered imperative; thus, no processing organization outside of Route 495 is included. In fact, all of the companies finally surveyed are within Route 128 or no more than a mile outside of it.

Initially, it was thought that only services based on IBM 360 and 370 equipment should be included because of IBM dominance and the obvious difficulties which would be encountered in transferring software to other equipment. It became quickly obvious, however, that computing equipment manufactured by Digital Equipment Corporation was making steady inroads into timesharing especially on the local university campuses. In light of the attractive operating economies of such machines, PDP-10 systems were also considered.

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As the survey progressed it became clear that still other machinery supported systems with unique and attractive features. Indeed a share of the local timesharing market is supported by equipment manufactured by CDC, Univac and Xerox. Therefore, although it had been briefly entertained, no service capability was excluded from initial consideration on the basis of equipment manufacturer.

Several other limitations were also imposed during the study. A decision was made that only those systems which could be accessed remotely from several locations using low-speed terminals were to be examined. Preference was to be given to systems which were conversational but services which allowed only remote batch submission were not to be excluded. Massive on-line storage was also considered important. The ability to attach tapes and disk packs on demand was felt to be extremely desirable. The ability to compile and install new programs and to monitor and alter the usage environment was considered indispensible.

4.0 SURVEY METHODOLOGY

An initial effort was the establishment of the scope and objectives of this investigation. Specifications were prepared limiting the geographical area to be considered and the type of service which would be appropriate to the NASIC interests. Sixteen topical areas were developed to establish a basis for a reasonable evaluation of the relevance of each service to NASIC.

Thirty possible timesharing computer service organizations were identified from several sources. Initial contact by telephone was then made with these organizations to establish whether or not their particular services were suitable. As a result of the screening activity, seventeen likely organizations were selected for site survey. These sites were again contacted and appointments for follow-up interviews were made. During these visits, the mission of the New England Board of Higher Education was described and a brief statement of the goals of the NASIC program was presented. A general description of the survey objectives and need for local processing services was also introduced to set a point of reference for discussion. The question areas were explored at each site and responses were recorded. A complete tour of each installation was also undertaken with special emphasis on the examination of user work areas. Descriptive documentation and manuals were procured. This material was then indexed and organized into a file. These documents, together with the notes of the interview, formed the basis of the recommendations, comments, evaluation and summaries which are presented in this report.

5.0 SURVEY DETAILS

5.1 Selection of Organizations

A list of thirty possible timesharing computer service organizations was compiled from several sources. A primary source was the Yellow Pages of the Boston Telephone Book. A list of contacts was also supplied by Bob Rolla, President of NERComP. Recommendations were also solicited from three computer manufacturers: IBM, DEC, and Xerox. The DEC representative prepared a useful list of service organizations. The other manufacturers representatives did not respond prior to completion of the field visits. Several national directories and computer trade publications were also consulted for additional information and possible leads.

Every organization on the list (see page 6) was contacted and screened briefly by phone. The one exception was International Timesharing, which could not be contacted throughout the survey period.

Organizations selected as candidates for a site visit are noted by an asterisk before their name. Records were kept of all conversations and the basis for rejection of any particular organization after the initial call can be determined in each instance, but these details are omitted from this report. The majority of organizations rejected advertised and promised a comprehensive and complete service, but in reality they provided only tailored and specialized packages for such purposes as billing and inventory control or else had very small special purpose machinery.

Organizations for which summary reports are presented in this report are noted by a double asterisk before their name. (See Figure 1).

5.2 Site Visit Activities

During each site visit, the New England Board of Higher Education (NEBHE) was introduced as a non-profit organization chartered by the Governors of the six states to look into areas of mutual interest and cooperation among the more than 200 higher educational institutions, colleges, and universities in the region. Reference was then made to the programs initiated by the Board which would require computer support: NELINET and NASIC. A brief description was given of NELINET, its goals and present status. NASIC was then discussed in some depth, emphasizing the regional resource utilization aspects and the important role the computer can play in making information available to scientific researchers in the Northeast.

A. Description of Need

To serve as a point of reference for the survey, some idea of the anticipated areas of service bureau utilization and likely NASIC services resulting was given. The need for access and retrieval from large data bases was projected. It was pointed out that the data bases being considered would be of both a bibliographic and substantive nature. Chemical Abstracts Condensates and the U. S. Census tapes were given as examples. It was emphasized that NASIC would not concern itself with the making of standard "number crunching" computational resources more

Figure I

LIST OF SERVICE BUREAUS CONSIDERED

ADL Systems, Inc.
** Avco Computer Services
Avtex Service Corp.
Bolt, Beranek and Newman, Inc.
** Computer Sciences Corp.
** Computility, Inc.
** Com-Share, Inc.
** Control Data Corp.
Data Operations, Inc.
Data Utilities of North America
** First Data Corp.
Halstead and Associates, Inc.
** Interactive Data Corp.
** Interactive Sciences Corp.
International Timesharing
Keydata Corp.
Leasco Response Inc.
** National CSS Inc.
National Information Services
* NERComP, Inc.
** On-Line Systems, Inc.
** PHI Computer Services, Inc.
Pillin Data Services, Inc.
** Scientific Time Sharing Corp.
* Service Bureau Corp.
** Systematic Data Processing Services
Time Brokers, Inc.
Time Share Corporation
** Tymshare, Inc.
** University Computing Corp.

accessible but rather was interested in use of the computer as an information dissemination machine.

No projection was given concerning the anticipated volume, startup dates, or size of the customer base for such services. SDI and retrospective information retrieval were described as probable activities but no indication was given of specific products since such products are still under development.

It was suggested that three different approaches might be pursued to make services available:

1. Direct purchase of services existing outside the Northeast.
2. Importation of data to be used with software already maintained locally.
3. Importation of both data and software with operation of these as a system locally.

Only these last two options, of course, would be of concern to a local service bureau.

Each contact was asked to relate to this need in terms of the company's previous experience with large data bases and present availability of data management software on the machinery.

B. Discussion Areas

During the site visits, each organizational representative was asked to respond to specific questions in sixteen different areas. It would, however, be improper to give the impression that these interviews involved strict interrogation. As conducted, the interviews were always cordial, relaxed, and unstructured from the point of view of the person being interviewed. Many other things were discussed than are reported here. No two interviews were even remotely similar. Nevertheless, adequate facts were gathered on the sixteen areas of interest during each encounter. The tabulation listed below identifies the areas discussed and gives some idea of the range of questions asked during the interviews.

1. History - Briefly describe the history of the company. When was it formed. What kind of customer did it intend to serve. Who were the key people behind the organization. What outstanding qualifications did they have. How has the company grown. What is the present size in dollar volume of sales or number of customers. What are its growth projections.
2. Organization - How many people are in the main office or the local branch. How are they organized. What is the ratio between sales people and technical staff. How many people are in customer service. Are contract programming services offered. If so, what are the special areas of capability of the consulting and programming staff.

3. Hardware - Give a complete description of the hardware configuration. How much core, disk, and tape storage is available. What facility exists for reading and punching cards or paper tape. Are any special devices of interest connected to the tape machine.

4. Offline Storage - What provision is made for disks and tapes. Are they physically safe. Are they secure from unauthorized use.

5. Line Printers - Are high-speed line printers situated locally. What is the quality of the printout. Can they print in upper and lower case. Can multiple part paper be mounted.

6. Operating System - What is the name of the operating system and what are its special features. Is it a modification of a well known system. What is the user interface like. Does it provide for adequate monitoring and cost accounting. Can a project leader restrict the resources seen by the user.

7. Programming Languages - What programming languages are available. Are there any simulation tools or special debugging systems. Can programs written in several different languages be used in a single application.

8. Relevant Software - Are packages for editing and retrieval already on the system. What facility exists for data management, especially for updating large text data bases. Is any software for accessing U.S. Census tapes being used.

9. Terminal Access - What kind of low speed terminals are used remotely. Are any special modifications of these terminals necessary.

10. Batch Use - Is there a capability for submitting batch jobs from a remote terminal. Is there a stand-alone batch mode. What kind of operating flexibility is there in the use of batch, especially if large quantities of time are needed.

11. Availability - What days and hours can the system be used. What is the record of reliable up-time during these scheduled hours.

12. Backup - Is there automatic backup of on-line information. How often is it performed. Is it easy to retrieve from backup tapes. Are standard procedures established for users to back up their own data. Are they easy to use.

13. Work Areas - Is there a local user work area. Are all the user manuals collected together in a single place. How accessible are the terminals. Is there desk space and storage space for work in progress.

14. Delivery Service - Has some means been provided for picking up tapes and disk packs and delivering bulk printouts to users. How much does it cost. How often are deliveries made.

15. Tariffs - Is there a complete list of charges. Are there any comparative cost bench marks. Are there priority rates, bulk rates, overnight discounts.

16. Contract - What does the contract form look like. Are there minimum amounts of use or minimum periods of obligation.

5.3 Post Visit Activities

Over four thousand pages of documentation and manuals were collected and placed into a file of backup materials. These supporting documents should be consulted while reading the summary section of this report. Documents obtained from each company were arranged in a logical order and assigned unique designation codes. Annual reports, general descriptions, and system overviews are first in each package, followed by manuals on specific subsystems and, finally, by rate schedules and terms and conditions of service. The unique designation codes consist of a three letter indication of the company name followed by a dash and a sequence number within the set. Whenever these documents are referenced in the summary, the designation codes are enclosed in brackets. For example, [IDC-15] refers to the fifteenth document in the file of materials on Interactive Data Corporation (IDC).

5.4 Survey Statistics

For readers interested in conducting a similar investigation some statistics may be of interest. In the course of this work over 120 telephone conversations were held. The average follow-up visit lasted one and one-half hours. Handwritten notes recording these conversations and the personal interviews required 94 pages. A very accurate time log was kept of the 150 hours spent on this project and the distribution of effort is tabulated below in round numbers:

Formulation of objectives, scope and questions	5 Hrs
Compilation of organization list and initial calls	10 Hrs
Follow-up visits and interviews	25 Hrs
Travel to follow-up visits	15 Hrs
Organization of materials	10 Hrs
Review of notes and materials	25 Hrs
Preparation of report draft	60 Hrs
TOTAL	150 Hrs

6.0 SUMMARY REPORTS

The pages that follow contain summaries, usually three or four pages in length, of the information pertaining to the fifteen companies surveyed. The first three items of each summary identify the company, contact person, and date of survey. Items four through nineteen reflect responses to the sixteen question areas. The summaries are organized into three groups depending on the hardware employed: IBM, Digital Equipment, and other. Frequent reference is made to the file of backup documents. These references are in brackets.

It is important to recognize the short term value of this material. The service industry is changing so rapidly that it would not be surprising if most of the information contained here became outdated within a year.

6.1 Observations of IBM Based Services

Five of the companies interviewed offered services based on IBM 360 or 370 equipment. These were National CSS(CSS), Interactive Data Corporation (IDC), Avco Computer Services (ACS), PHI Computer Services, Inc. (PHI), and Systematic Data Processing Service (SDP). CSS and IDC both offer a CP/CMS kind of environment. CSS is somewhat larger and seems to have more experience than IDC. IDC specializes in financial services and has its headquarters in the local area. It should be noted that Tymshare has announced its intention to begin competitive service in the fourth quarter of 1973 but it seems unlikely that they will be a major factor for some time to come owing to the considerable understanding CSS and ISC have of the system involved. Several CSS users are utilizing CENSAC, a subsystem for accessing U.S. Census tapes.

ACS is the only local company offering TSO. Since IBM expects to support TSO very heavily in the coming years, this may weigh in ACS' favor. IBM anticipates that TSO systems will be the wave of the future and CP/CMS systems will be little more than a curiosity. Also, ACS users maintain several very large data bases.

PHI offers WYLBUR which is an editing system facilitating remote batch processing. As such it does not, strictly speaking, provide interactive timesharing services. PHI argues that WYLBUR costs only about half as much as systems like TSO. Within its limits, their argument is fairly sound. TSO should not be used if WYLBUR will do. Until recently, one of PHI's customers offered information retrieval from ERIC and other data files.

SDP has indicated that it will also offer WYLBUR in the last quarter of 1973 and possibly TSO sometime in 1974. Rates have not yet been established, of course. These plans give cause for evaluating SDP again in the near future.

1. Company

Address:

National CSS, Inc.
300 Westport Ave
Norwalk, Connecticut 06851

Local Office:

National CSS, Inc.
1033 Massachusetts Ave
Cambridge, Massachusetts 02138

Telephone:

(617) 868-2950

2. Contacts

Robert W. Perry, Marketing Representative

George J. Hayes, Technical Representative

3. Date

July 27, 1973

4. History

National CSS was founded in March 1967 by Richard H. Orenstein, a systems programmer at MIT working on development of the CTSS system, together with several other systems people from MIT and the IBM Cambridge Scientific Center. These people recognized the considerable potential in making an IBM 360/67 based time sharing service viable. Borrowing heavily from the CP/CMS software designed by the Cambridge Scientific Center, they developed VP/CSS, an operating system functionally almost identical with CP/CMS but having far less overhead. [CSS-2,1] After a slow start, revenues picked up remarkably in 1969. The company went public in January 1970 and their salesmen claim it to be the largest independent (i.e. not owned by a mainframe manufacturer) timesharing service. (The same claim is also made by

TYMSHARE.) The latest figures on total revenue show the two companies to be in a horse race. [CSS-1,5] [TYM-1,1]

National CSS now has seven IBM 360/67 systems located in data centers in Stamford, Connecticut and Sunnyvale, California. In addition, there are thirteen sales offices. Emphasis has been on serving the business and financial community but there are also a fair number of engineering and scientific users.

Installation of an IBM 370/168 has been scheduled for late 1974 and the company is evaluating and examining the Honeywell MULTICS system for possible use. [CSS-1,3] Also it is expected that PDP-11's will be installed at each branch office to improve the system's communications capability and broaden geographical coverage. [CSS-1,2]

5. Organization

The Cambridge office has a branch manager, 5 marketing representatives, 4 technical representatives, 1 computer operator and 2 secretarial and clerical assistants. The technical representatives have experience in PL/1, COBOL, FORTRAN, and RAMIS as well as in the operating system and its features. In addition, more complicated questions can be handled by the product marketing and technical staff at the company headquarters which numbers over 50 persons.

6. Hardware

4 IBM 360/67 in a "twin duplex" configuration with:

- 4 million bytes of core storage
- 12 IBM 2301 drums
- 112 Memorex 660 disk drives
- 8 IBM 2316 disk drives
- 14 9-track tape drives
- 1 7-track tape drive
- 3 IBM 1403 printers
- 2 card readers and punches

The above equipment is located in Stamford; more hardware is available at Sunnyvale. A chart of the system configuration can be found in NCSS's publication "Newsline". [CSS-3]

7. Offline Storage

Storage is available for magnetic tapes and disk packs.

8. Line Printers

The branch office has a Data 100 with upper case only. The Stamford data center has IBM's 1403's with upper and lower case capability.

9. Operating System

The operating system is known as VP/CSS, which is very similar to CP/CMS [CSS-4] but more efficient. Several new commands have been added, command abbreviations have been introduced for user convenience, and the EXEC command has been substantially upgraded, allowing for a fairly complex executive language. [CSS-6]

10. Programming Languages

BASIC, COBOL F, ANS COBOL 3 & 4, FORTRAN Levels G & H, Assembler Levels F & H, PL/1 F Optimizing, XBASIC, WATFIV, AED, SNOBOL4. [CSS-4,8]

11. Relevant Software

NCSS supports RAMIS (Rapid Access Management Information System), a proprietary product developed by Mathematica, Inc. of Princeton, N. J. [CSS-7] Although oriented more toward management of personnel files, inventory control, market research, production analysis and the like, it does have some text retrieval capabilities. Also of interest is CENSAC, a proprietary product of Urban Decision Systems, Inc. of Los Angeles, California. CENSAC provides methods for retrieving, formatting and tabulating information from census files. Libraries of census data tapes for use with CENSAC are located both in Stamford and Sunnyvale. [CSS-8] [CSS-9]

12. Terminal Access

ASCII terminals at 10, 15 and 30 cps
IBM 2741's and their equivalents
IBM 2780's and their equivalents, such as Data 100's or IBM 1130's

13. Batch Use

Batch jobs may be submitted from on-line terminals by creating a special EXEC file.

14. Availability

Weekdays	7:30 a.m. to 12 midnight
Saturday	7:30 a.m. to 6 p.m.

15. Backup

On line information is backed up nightly and saved for one week, one weekly backup is saved for three months, and one monthly backup is saved for one year. A simplified backup service for off-line data is also provided. Backup of off-line data and any retrievals are initiated by the user.

16. Work Areas

The Cambridge branch office has 4 consoles, a keypunch, some desk space, and a complete set of reference manuals for users. A Data-100 for reading cards and line printing adjoins the user work area and is controlled by a computer operator.

17. Delivery Service

A daily delivery service runs between the branch office and the Stamford data center carrying tapes, disk packs and printouts. Local delivery from the branch office to the customer is subject to additional arrangements.

18. Tariffs

Connect time for low speed devices is $10 per hour. CPU is at $.38 per second with a surcharge for proprietary products such as RAMIS. For more details see Schedule A. [CSS-12]

19. Contract

A two-page agreement sets forth the terms and conditions. [CSS-13]

1. Company

Address:

Interactive Data Corporation
486 Totten Pond Road
Waltham, Massachusetts 02154

Telephone:

(617) 890-1234

2. Contact

Shiela Grove, Technical Consultant

3. Date

July 31, 1973

4. History

Interactive Data Corporation was formed in December of 1968, by the merger of Computer Communications Center and the Interactive Data Services Division of White, Weld & Co. IDC's president, Jack Arnow, graduated from MIT and was a group leader of MIT's Lincoln Laboratory Computer Systems Group during a period of considerable innovation and development of CP/CMS at the Laboratory's Computer Center. [IDC-15] IDC emphasizes services for the financial community. Some of the packaged financial services facilitate portfolio management and stock market analysis.

IDC has a duplex IBM 360/67 located at its Waltham headquarters and has five branch offices.

5. Organization

The headquarters has 3 marketing representatives and 2 technical consultants. In addition there is a staff of 50 systems people developing new packages and products as well as doing systems support. The headquarters also has 15 persons available for contract programming, 20 in operations and 10 in management.

6. Hardware

2 IBM 360/67 in a "duplex" configuration with:

1.5	million bytes of core storage
16	million bytes of on-line drum storage
70	2314 disk drives with more than 1 billion bytes of on-line disk storage (on-line user may mount up to 5 disk packs)
6	9-track tape drives
2	7-track tape drives
1	IBM 1403 high speed printer
1	card reader and punch

The above equipment is located in Waltham. Another IBM 360/67 is located in San Francisco and it is possible to send data between the two machines.

7. Off-Line Storage

Storage is available for magnetic tapes and disk packs.

8. Line Printers

The Waltham headquarters has an IBM 1403 high speed printer with upper and lower case capability.

9. Operating System

The interactive operating system is known as CS/ES which is a modified version of CP/CMS made to look more like a time sharing system than a virtual machine.

10. Programming Languages

FORTRAN IV Levels G and H, COBOL F, ANS COBOL, PL/1 F Optimizing, Assembler Levels F, G and H, SNOBOL, GPSS, BASIC, DYNAMO, AED and others. [IDC-4] [IDC-5]

11. Relevant Software

IDC supports system 204, a specialized file access method developed by the Computer Corporation of America for handling inverted files. Also supported is Census Method II, a package developed by the Bureau of the Census for analyzing economic time series but having little application to manipulation of 1970 census data. The bulk of IDC's software packages such an Analystics, XPORT and IAL are aimed at financial users. Some of the data bases maintained on the system are of considerable use to economists, including price indices, manufacturing activity, retail and wholesale trade, and many others. [IDC-6] The closing stock prices are available about an hour after the market closes. In fact, the heaviest system use occurs between 4 and 5 p.m. as users analyze their portfolios subsequent to the arrival of this data.

12. Terminal Access

ASCII terminals at 10, 15 and 30 cps
IBM 2741's and their equivalent

13. Batch Use

Batch jobs may be submitted from on-line terminals using a feature called "disconnect and run" which is controlled by an EXEC file. Stand-alone batch jobs may also be run using JCL and submitted over-the-counter.

14. Availability

Weekdays 8:00 a.m. to 12 midnight
Saturday 8:00 a.m. to 5 p.m.

15. Backup

The user is responsible for proper backup of his data. Utilities are provided for performing these functions.

16. Work Areas

A work area consisting of 3 small cubicles, 3 2741 terminals, and 2 keypunches is available at the Waltham headquarters. A set of manuals is located nearby. The work areas are inconveniently small and crowded.

17. Delivery Service

Only mail delivery is available. Other pickup must be arranged by the user.

18. Tariffs

Connect time for low speed devices is $10 per hour. CPU is at $.28 per second. Local dialup is available from Boston, Hartford, New York City and several other locations outside New England. [IDC-15]

19. Contract

A three page agreement is made between customer and IDC.[IDC-17]

1. Company

Address:

Avco Computer Services
Avco Systems Division
201 Lowell Street
Wilmington, Massachusetts 01887

Telephone:

(617) 729-7700

2. Contacts

Peter R. Connery, Senior Sales Representative
Edwin A. Mercer, Jr., Sales Manager
John M. Barry, Software Systems

3. Date

August 9, 1973

4. History

Avco Computer Services was established in 1958 to meet in-house needs of Avco Corporation as well as to serve scientists and engineers from the outside community. Avco, one of the nation's leading defense and aerospace corporations, now does more than $1 billion worth of business annually. ACS has had considerable experience with users of large data bases and also provides services to business and financial users. [ACS-1] Harvard, MIT, Tufts and University of New Hampshire all had occasion to use ACS, usually when a job has special requirements which cannot be met by their own computer centers. MIT users, for example, are especially attracted to the digital graphics facility which makes it possible to create computer produced motion pictures on film.

ACS has an IBM 360/75 with TSO for conversational purposes. RJE and batch processing services are also available. An IBM 370/158 is expected soon.

5. Organization

ACS has special people in sales and ten systems support people who upgrade and maintain the software. In addition there are several special software groups with special expertise. For example, the management systems group consists of twelve people working on software for business applications. There is also an adequate operations staff, including six keypunch operators.

6. Hardware

An IBM 360/75 with:

2	million bytes of core
25	IBM 2316 disk drives or equivalent
6	9-track tape drives
2	7-track tape drives
4	IBM 1403 high speed printers
1	card reader
1	card reader/punch
1	paper tape reader/punch

In addition there is an off-line Calcomp 890 plotter and several card handling machines such as a sorter, reproducer and printer. [ACS-2]

7. Off-Line Storage

Storage is available for magnetic tapes and disk packs. These may be rented from ACS, purchased from ACS, or supplied by the user. User owned tapes and disks are stored free of charge.

8. Line Printers

Four IBM 1403 high speed printers are on the system. One of the printers always has a TN or SN (courier font) train mounted. The operations staff is careful to always keep the printers well adjusted and excellent quality upper and lower case copy can be produced.

9. Operating System

The IBM-supplied TSO with some minor modifications has been installed and running since July 1, 1973. The rate schedule for this service has not yet been established.

10. Programming Languages

Assembler F and G. COBOL F, ANS COBOL versions 2 and 3, PL/1 F, PL/1 Optimizing, FORTRAN G and H,and others.

11. Relevant Software

IBM's Information Management System/360 (IMS) and Informatic's MARK IV File Management System are both available. [ACS-8] [ACS-9] [ACS-10] Neither system provides a decent user language for interaction.

12. Terminal Access

ASCII terminals at 10, 15 and 30 cps
IBM 2741's and their equivalent

13. Batch Use

Batch jobs may be submitted from TSO by creating a file containing the appropriate JCL. ACS also maintains an RJE facility and jobs may also be submitted over the counter.

14. Availability

From 8 a.m. Monday mornings until 4 p.m. Saturday afternoons, around the clock service except for brief periods of maintenance.

15. Backup

On-line information is backed up weekly and kept for three weeks. The user is responsible for backing up his own data.

16. Work Areas

An elaborate suite of 12 rooms, each with 2 desks, filing cabinets and storage space, is provided for users. Reference manuals are readily available. Eight keypunches and several card handling machines are also provided. The users seemed to be working in comfort and with efficiency.

17. Delivery Service

Bonded couriers will deliver and pick up material two or three times a day at no extra charge.

18. Tariffs

Prices for TSO have not yet been established. Prices for batch service are outlined in the published price list. [ACS-11]

19. Contract

There is no standard agreement form for using the ACS service. A special proposal is written by ACS for each customer.

1. Company

Address:

PHI Computer Services, Inc.
24 Mill Street
Arlington, Massachusetts 02174

Telephone:

(617) 648-8550

2. Contact

J. Kieth Lehto (617) 851-4111

3. Date

August 9, 1973

4. History

PHI was started by Phil Hankins in 1959 and is one of the oldest data centers in New England. In 1967 it was sold to Wang Laboratories and it is now a wholly owned subsidiary. The company has been heavily oriented toward the scientific user.

PHI has an IBM 360/65. Jobs are submitted to the machine by means of the WYLBUR system.

5. Organization

There are three PHI offices in Massachusetts, The Data Center at Arlington, a remote entry office at Brattle Square in Cambridge, and another remote entry office at Wang Laboratories in Tewksbury. Some people associated with the data center have their offices in Tewksbury because of overcrowding in Arlington. The data center has 3 marketing representatives, 4 customer support people, 4 systems programmers and about 30 people in operations. In addition, there is a large staff of programmers working on proprietary packages and a sizable keypunching group.

6. Hardware

An IBM 360/65 with:

2	million bytes of core
35	IBM 2316 disk drives
10	9-track tape drives
1	7-track tape drive

4	IBM 1403 high speed printers
1	magnetic tape cartridge reader
3	card reader/punches

There is also an auxiliary computer equipped with a paper tape reader and punch and an optical scanner. [PHI-2,6] [PHI-7]

7. Off-Line Storage

Storage is available for magnetic tapes and disk packs.

8. Line Printers

An IBM 1403 with upper and lower case capability is available. The TN, SN (courier) and QN (Library of Congress) trains may be mounted.

9. Operating System

The system available to users of low speed terminals is called WYLBUR. This system, developed at Stanford, allows users to create, inspect and alter files and submit jobs to the batch stream. As such it is more like a remote entry system than a conversational time-sharing system. After a job has been run, WYLBUR may be used to look at the results.

10. Programming Languages

Assembler F and G, BASIC, COBOL E and F, ANS COBOL, PL/1 F, FORTRAN G and H, ALGOL, SNOBOL, DYNAMO, GPSS and many others. [PHI-6]

11. Relevant Software

PHI has MacMillan Information's Myriad system which has been used to search Research in Education (RIE), Current Index to Journals in Education (CIJE), and Vocational and Technical Education (AIM & ARM). The New England Regional Commission was using this package to serve users in the education field. The data is also available from MacMillan. [PHI-4] [PHI-5] PHI can also make IMS and MARK IV available.

12. Terminal Access

ASCII terminals at 10, 15 and 30 cps
IBM 2741's and their equivalent
IBM 2789's, 1130's and other binary synchronous devices.

13. Batch Use

The system is available for batch use via WYLBUR, RJE and as an over-the-counter batch service.

14. Availability

Continuous except for short periods of maintenance.

15. Backup

The user is responsible for backing up his data.

16. Work Areas

Work areas include 6 rooms with tables, 4 consoles, 4 keypunches and lockers. Some card processing machines, such as a sorter and interpreter, are also available. Manuals are located in the work areas and in the adjoining system staff's library.

17. Delivery Service

Delivery is available twice daily within seven air miles of Arlington for a fee of $1. Other delivery is by negotiation and generally in the $5 to $10 range.

18. Tariffs

Connect time on WYLBUR is $10 per hour plus processor. Average WYLBUR cost is about $12 per hour with processor. Other rates are as detailed in Schedule A-1. [PHI-8] [PHI-9,2]

19. Contract

Schedule B [PHI-9,3] outlines the terms and conditions of agreement.

1. Company

Address:

Systematic Data Processing Service, Inc.
400 Totten Pond Road
Waltham, Massachusetts 02154

Telephone:

(617) 890-1200

2. Contact

James H. Corbett, Jr., Marketing Representative

3. Date

July 31, 1973

4. History

SDPS was formed in 1968 from Data Processing Financial and General. The company has a background in scientific and engineering applications as well as in business.

Presently SDPS has IBM 370/155 with RJE and is expecting to install WYLBUR in October 1973 and possibly TSO in early 1974.

5. Organization

SDPS is a company of about 25 people. There are two marketing representatives, about five people in administration, five or so systems support people, ten in operations and a few clerical assistants.

6. Hardware

An IBM 370/155 with:

2	million bytes of core
6	IBM 3330 Disks
14	IBM 2315 Disk Drives
7	9-track Tape Drives
1	7-track Tape Drive
3	IBM 1403 Printers
1	card reader/punch

[SDP-1,IX.2] [SDP-1,T-V.1]

7. Offline Storage

Storage is available for magnetic tapes and disk packs.

8. Line Printers

The IBM 1403 printers have upper and lower case capability with TN, SN and ALA trains.

9. Operating System

SDPS operates under OS/MVT. Plans call for installation of WYLBUR by October 1973. This will make the SDPS service accessible through low speed remote terminals for submission of jobs. Further tentative plans call for the installation of TSO in 1974 but these plans are far from definite.

10. Programming Languages

AED, ALGOL, Assembler F, COBOL E and F, ANS COBOL, FORTRAN G and H, PL/1 F and others. [SDP-1,IX.3]

11. Relevant Software

With the possible exception of Data-Text, which is very useful for statistical work and may have some use in processing census information after retrieval, no relevant software packages are maintained. [SDP-2] SDPS will make every attempt to acquire any programs or packages requested by the user.

12. Terminal Access

No low speed access presently available, but will be provided soon when WYLBUR is installed.

13. Batch Use

The machine is used exclusively by over-the-counter batch jobs and six RJE terminals.

14. Availability

Continuous except for short maintenance periods.

15. Backup

User is responsible for backing up his data.

16. Work Areas

The user work area consists of 12 cubicles with tables and chairs. There is also a punch card equipment area with four keypunches, one verifier and a sink.

17. Delivery Service

Delivery service can be provided at a nominal charge of $.18 per mile round trip from Waltham. [SDP-1,V.1]

18. Tariffs

Rates for WYLBUR have not been established. Other rates are noted in the schedule. [SDP-3]

19. Contract

Terms and conditions are set forth in the client information manual. [SDP-1,X.1]

6.2 Observations of Digital Equipment Based Services

Three local companies, Interactive Sciences Corporation (ISC), First Data Corporation (FDC), and Computility (CPU) offer the DEC system-10 timesharing system on PDP-10 machinery. On-Line Systems (OLS), based in Pittsburgh, offers similar services via local dialup. Tymshare also uses PDP-10 machinery but since their monitor is differnt and mimics their XDS 940 systems, it is described elsewhere. The three local services compete very strongly among themselves, frequently underbidding one another for a particular customer's attention. Bulk rates and other special considerations are given as inducements. The three systems are very similar for the simple user but are not as comparable when more demanding support is needed. ISC seems to be the most solid of the three and both ISC and FDC seem to make software innovations more readily than CPU. Disks can also be mounted more easily at ISC and FDC. OLS competes somewhat for the small engineering users but does not have many large customers in the Boston area.

1. Company

Address:

Interactive Sciences Corporation
60 Brooks Drive
Braintree, Massachusetts 02184

Telephone:

(617) 848-2660

2. Contact

Peter C. Melvin, Northeast Regional Manager

3. Date

August 6, 1973

4. History

Interactive Sciences started as a spinoff from the Foxboro Corporation in April, 1968. Emphasis has always been on serving engineers and scientists. After considerable difficulties during the recession, the company began to grow rapidly in 1970 and its volume of business is now doubling every year. The main office is in Braintree and there are branch offices in New York, Pittsburgh, and Arlington, Va. A west coast office will be added soon.

ISC operates 2 PDP-10 computers in Braintree and is soon going to add a third machine. Local dialup is available from Albany, Chicago, Detroit, Cleveland and Philadelphia in addition to its branch office locations.

5. Organization

There are 35 people in the main office in Braintree. Four divisions report to the President: Engineering, Financial, Customer Services, and Marketing. Engineering is the largest with two parts (Systems Support and Operations). Approximately 10 people are in each. Marketing also has two parts. One part, called "Computeria" staffed with 4 people, looks into new products and does projective analysis. The other part is Sales and consists of 2 people. The other two divisions are Financial with 3 people and Customer Services with 5 including a contract programming team.

6. Hardware

One PDP-10 with:

384 thousand characters of core storage
3 high speed drums
8 disk packs
8 Dectape drives
2 9-track tape drives
2 7-track tape drives
1 card reader

1 high speed printer
1 paper tape reader/punch

There is also a second system with almost identical equipment. [ISC-3]

7. Offline Storage

Storage is available for magnetic tapes and disc packs including a secure vault.

8. Line Printers

The high speed line printers have upper case only.

9. Operating System

Digital's DECSYSTEM-10 monitor is used with about fifteen percent of the code rewritten. Special emphasis has been placed on speed up disk access. FORTRAN has also been improved.

10. Programming Languages

BASIC, FORTRAN, COBOL, MACRO assembler, and LISP.

11. Relevant Software

ISC supports the Information Management and Retrieval System (IMARS) which has a number of useful functions but is restricted to fixed length fields of information. [ISC-7] Several text editing systems are also available including edit 10, QED, TECO, and TED. [ISC-8] [ISC-9] [ISC-10] [ISC-12]

12. Terminal Access

ASCII terminals at 10, 15 and 30 cps
BCD and EBCDIC conversion is also supported.

13. Batch Use

Batch use as such is not available from a console but arrangements can be made for deferred processing at lower or bulk rates.

14. Availability

Continuous except for brief periods of maintenance.

15. Backup

User is responsible for backing up his off-line data. On-line data is backed up nightly and saved for a week, weekly backup is saved for a month and monthly backup is saved for two years.

16. Work Areas

The user area consists of four rooms with desks, six teletypes, and one keypunch.

17. Delivery Service

Pickup and delivery of material is arranged through a messenger service.

18. Tariffs

Connect time is $9.00 per hour in prime shift and $6.00 per hour during non prime time. Computer use is at one cent (1¢) per second CPU prime time and 2/3¢ per CPU non prime. Bulk rates and discounts are available. [ISC-2,14]

19. Contract

A four-page agreement sets forth the conditions of service. [ISC-14]

1. Company

Address:

First Data Corporation
400 Totten Pond Road
Waltham, Massachusetts 02154

Telephone:

(617) 890-6701

2. Contact

Fred W. Weil

3. Date

July 31, 1973

4. History

First Data was started in June 1970 by three people with heavy systems background acquired at Digital. First Data itself is in the same office space and using the same machines as the former Codon Corporation. New England Merchants National Bank financed the venture. [FDC-2] First Data took over most of the customer base of the now defunct Codon as well. At present there is a dual processor and a single processor PDP-10 at FDC and soon there will be another machine. The single processor machine is run under a facilities management contract and is dedicated to an NIH information service.

5. Organization

There are forty-two people in the company. These include thirteen in sales (six of whom are in the New York and Washington offices), ten in operations, four in communications, five in systems support, and ten in management and administration.

6. Hardware

One Dual Processor PDP-10 with:

512	thousand characters of core storage
2	drums
16	disk drives
2	9-track tape drives
1	7-track tape drives
8	Dectape drives
1	line printer
1	card reader/punch
1	paper tape reader/punch

[FDC-4]

7. Offline Storage

Storage is available for magnetic tapes and disk packs.

8. Line Printer

The line printer has upper case only but a facility exists for writing tapes and having them printed at SDPS which is located in the same building.

9. Operating System

Digital's DECSYSTEM-10 timesharing monitor is used with some modifications.

10. Programming Languages

FORTRAN, BASIC, COBOL, ALGOL, LISP, PDP-2, SNOBOL and MACRO Assembler.

11. Relevant Software

FDC supports the Data Management and Retrieval System (DMARS) which seems to be identical to the IMARS offered by ISC. FDC also has a special, proprietary random access disk system called RAX. [FDC-9] There is also a good selection of file editors. Debugging aids include RAID and MIMIC.

12. Terminal Access

ASCII terminals at 10, 15, and 30 cps, 2741's, and ARDS terminals are supported. [FDC-3,1]

13. Batch Use

A special facility is available for submitting batch jobs. [FDC-7] [FDC-8]

14. Availability

Daily from 7 a.m. until 2 a.m. each following morning.

15. Backup

User is responsible for backing up his off-line data. On-line data is backed up each night and saved for one month. A monthly backup is saved for six months.

16. Work Areas

The user area consists of a room adjoining the computer with six terminals and a set of manuals.

17. Delivery Service

No regular delivery service exists but it can be arranged.

18. Tariffs

Connect time is $7.50 per hour in prime shift and $5.00 per hour otherwise. CPU is charged on a scale depending on core use. [FDC-13]. Batch rates are about half as high [FDC-14] and bulk rates are available. There are surcharges for proprietary packages. [FDC-15]

19. Contract

A two-page contract sets forth the terms and conditions. [FDC-16]

1. Company

Address:

Computility, Inc.
131 Tremont Street
Boston, Massachusetts 02111

Telephone:

(617) 423-6780

2. Contact

John McGunnigle

3. Date

August 15, 1973

4. History

Computility was founded in 1967 but went bankrupt in 1970. It was reconstituted by Grumman Data Systems Corporation in January 1971 and it is now a subsidiary of Grumman. The company seems to be emphasizing business and financial services more than scientific and technical. Presently, Computility operates a single PDP-10 in Boston. In October 1973 a second processor for the PDP-10 is expected and in April 1974 another PDP-10 will be added. This last system will be dedicated to a single application and will not be available to the public.

5. Organization

There are about 20 people in the company. Precise breakdown of the number of sales representatives, systems people and operators is unknown.

6. Hardware

1 PDP-10 with:

512 thousand characters of core storage
8 disk drives
5 Dectape drives
4 7-track tape drives
1 9-track tape drive
1 line printer

7. Offline Storage

Storage is available for Dectapes and standard magnetic tapes. Storage for disk packs is by special arrangement only. It is usually not possible to mount disk packs during the day. Space can be guaranteed on a long term basis by renting a disk drive.

8. Line Printers

The line printer has upper case only.

9. Operating System

Digital's DECSYSTEM-10 timesharing monitor is used.

10. Programming Languages

FORTRAN, BASIC, COBOL, ALGOL, LISP, SNOBOL and MACRO Assembler. [CPU-11]

11. Relevant Software

IMARS is supported. Three editing commands are available.

12. Terminal Access

ASCII terminals at 10, 15 and 30 cps are supported.

13. Batch Use

A facility is available for submitting batch jobs.

14. Availability

Daily from 8 a.m. till midnight.

15. Backup

User is responsible for backing up his own data.

16. Work Areas

Three teletypes and desks are located adjacent to the computer room.

17. Delivery Service

Twice daily deliveries are made in the local area at no extra charge.

18. Tariffs

Connect time is $8.00 per hour in prime shift and $5.00 per hour otherwise. CPU is charged at $.03 per second. There is a surcharge. for use of certain software packages. [CPU-6]

19. Contract

A two-page agreement sets forth terms and conditions. [CPU-7]

1. Company

Address:

On-Line Systems, Inc.
115 Evergreen Heights Drive
Pittsburgh, Pennsylvania 15229

Local Office:

40 Washington Street
Wellesley, Massachusetts 02181

Telephone:

(617) 237-5070

2. Contact

Kim Mason

3. Date

August 3, 1973

4. History

On-Line Systems was started in 1967 by several people who had been working on General Electric's timesharing network. There are now 7 PDP-10 computers operating in Pittsburgh. These machines can be dialed from 19 different locations across the country through a private network. The systems operate independently. Usually a user is assigned to a specific machine and he may have an alternate machine for backup if the first one is not operating.

5. Organization

In addition to a fairly large central staff in Pittsburgh, On-Line Systems maintains 12 branch offices. In the Boston office there are 3 sales representatives and 2 technical representatives.

6. Hardware

An accurate description of the hardware was requested but was not provided by the local office. It was conjectured that each of the 7 PDP-10's had 128K words of core, and about 50 million characters of disk space could be made available to a user. Mounting of disk packs at user request seemed doubtful.

7. Offline Storage

Offline storage of tapes is available.

8. Line Printer

An upper and lower case high speed printer is located in Pittsburgh.

9. Operating System

A proprietary operating system is employed. Documentation of the system's features was not available from the local office.

10. Programming Languages

FORTRAN IV, Basic, COBOL, Telcomp and APL.

11. Relevant Software

A proprietary information management system called OLIVER is provided. [OLS-8] [OLS-9] This package is being used by such government departments and agencies as the Department of Commerce, HEW, and the Cost of Living Council.

12. Terminal Access

ASCII terminals at 10, 15 and 30 cps are supported

13. Batch Use

A deferred batch capability exists.

14. Availability

24 hours daily including weekends.

15. Backup

An archival backup system exists and files can be retrieved by user request.

16. Work Areas

No user work area has been established.

17. Delivery Service

Printouts and tapes are delivered by mail from Pittsburgh.

18. Tariffs

Connect time is $10.00 per hour and CPU time is$.05 per unit. Note that there are charges for tape handling and operator intervention. There is also a monthly minimum. [OLS-10]

19. Contract

A two-page agreement sets forth the terms and conditions. [OLS-11]

6.3 Observations of Services Based on Other Equipment

This final group of six companies either based their services on equipment other than IBM and DEC or their operating systems obscured the traditionally expected features of the machine. Two of the services were based on Univac 1108's, one on a CDC 6600, one on a combination of Xerox 940's and PDP-10's, one on a combination of Xerox 940's and Xerox Sigma 9's, and finally, one on an IBM 360 with a highly restrictive operating system. Most of these services are interesting for their proprietary software and unique features of the machinery. Some of them are distinctly inferior when considered as general interactive timesharing facilities. Computer Sciences Corporation (CSC) is of note by virtue of its heavy involvement with government agencies, some of whose retrieval programs are run on INFONET. Control Data Corporation (CDC) merits attention for the CENSTAT package and accompanying U.S. census tapes. Tymshare (TYM) is of interest because of its extensive TYMNET communications network and the availability of the SITE and RETRIEVE software packages. Com-Share (COM) has a data management package called COMPOSIT '77. University Computing Corporation (UCC) has chart plotting features built into its management information system. Scientific Time Sharing (STS) shows some novel ways of handling text in a system oriented almost exclusively toward algebraic manipulation.

1. Company

Address:

Computer Sciences Corporation
Information Network Division
650 North Sepulveda Boulevard
El Segundo, California 90245

Local Office:

One Gateway Center
Newton, Massachusetts 02158

Telephone:

(617) 969-1628

2. Contact

Ben Young

3. Date

August 2, 1973

4. History

CSC was founded in 1959 by Fletcher Jones and Roy Nutt. It has grown to become the world's largest independent software house and employs over 6000 people. Jovial and a number of other languages were originally developed by CSC. The company has been heavily involved in software and data base work for the federal government. In 1970 the INFONET service was begun. This service allows for conversational interaction and remote batch processing on Univac 1108 computers. There are 22 branch offices from which INFONET is available as a local dialup facility.

5. Organization

There are over 500 persons in the Information Network Division of CSC, most of them stationed in California. The Boston office consists of a branch manager, 3 marketing representatives and 3 sales representatives.

6. Hardware

The hardware configuration differs from center to center but typically consists of a Univac 1108 with:

3 highspeed drums with about 750 thousand words
2 low speed drums with about 4 million words
12 disks with about 70 million words
6 tape drives (7 and 9-track)
card punches
card readers

7. Offline Storage

Offline storage of tapes is available.

8. Line Printer

Only upper case printout is available. Printing is normally done on a Data 100 batch terminal at the local office.

9. Operating System

The operating system was written by CSC and is called CSTS. The conversational capability is mainly used to edit files for submission as a remote batch job.

10. Programming Languages

FORTRAN IV, FORTRAN V, COBOL, CSTS Assembler.

11. Relevant Software

Data Management Language (DML) has been used by many government agencies to do information management and retrieval. [CSC-5]

12. Terminal Access

ASCII terminals at 10, 15 and 30 cps.

13. Batch Use

Remote batch processing is a major use of the system.

14. Availability

7 a.m. to 12 midnight weekdays
7 a.m. to 5 p.m. Saturdays

15. Backup

Backup of on line information is provided and retrieval can be requested by users.

16. Work Areas

The local office has a work area consisting of 2 user rooms with desks, 5 low speed terminals and a remote batch terminal with a card reader and line printer.

17. Delivery Service

Deliveries from the local office are by arrangement.

18. Tariffs

Connect time is charged at $11.50 to $15.00 per hour during prime time depending on speed of terminal. CPU time is charged at $25.00 per service unit. There is an initiation fee and a minimum monthly charge. [CSC-6]

19. Contract

A one-page agreement sets forth the forms and conditions. Customer must give 30 days notice of termination. [CSC-7]

1. Company

Address:

Control Data Corporation
8100 34th Avenue South
Minneapolis, Minnesota 55440

Local Office:

60 Hickory Drive
Waltham, Massachusetts 02154

Telephone:

(617) 890-4600

2. Contact

Jack Dunn

3. Date

August 9, 1973

4. History

Control Data, a large manufacturer of computer equipment, has been selling timesharing services since 1963. Presently, these services are distributed through the CYBERNET network which connects over 40 service centers with 12 CDC 6600 computers. [CDC-8, 4]

5. Organization

Over 200 persons work in the Boston office of Control Data. It was impossible to ascertain precisely how many of these are involved in CYBERNET services since the office is also the regional sales and field service headquarters. It seems likely that about 30 people are closely allied with the timesharing service.

6. Hardware

Documentation of the precise configuration at the local office was requested but could not be made available. The computer is a CDC 6600 with 131K words of core and several 7-track and 9-track tape drives. A large disk storage device is attached. No provision is made for removable disk packs.

7. Offline Storage

Storage is available for magnetic tapes and punched cards.

8. Line Printers

Only upper case printout is possible on the high-speed printers.

9. Operating System

The operating system is known as KRONOS and it allows for interactive timesharing, remote batch and over-the-counter batch services. [CDC-8,6]

10. Programming Languages

FORTRAN IV, Extended BASIC, ALGOL, COBOL, Simscript and others.

11. Relevant Software

The CENSTAT package, developed by Westat Research Inc., is available through the CYBERNET network. A large library of U.S. Census tapes accompanies this package and can be mounted by users. [CDC-10] [CDC-11] [CDC-12] A data management package called "System 2000" is also provided.

12. Terminal Access

ASCII terminals at 10 and 30 cps.

13. Batch Use

Batch jobs may be submitted for background or deferred running.

14. Availability

7 a.m. to 11 p.m. daily.

15. Backup

Some form of backup is available for online data but the characteristics of the system were not made known.

16. Work Areas

The user work area consists of 7 rooms with double tables, 5 keypunches, reference manuals and lockers.

17. Delivery Service

Delivery service can be arranged at user expense.

18. Tariffs

Connect time is $8.00 for 10 cps and $15.00 for 30 cps terminals per hour. Conversational use is $.20 per system second.

19. Contract

A five-page agreement with attachments sets forth the terms and conditions. [CDC-14]

1. Company

Address:

Tymshare
10340 Bubb Road
Cupertino, California 95014

Local Office:

1001 Watertown Street
West Newton, Massachusetts 02165

Telephone:

(617) 965-2600

2. Contact

Donald Bennett

3. Date

August 13, 1973

4. History

Tymshare was started in May 1965 by T. J. O'Rourke who left General Electric in Phoenix. Originally, the company concentrated on time-sharing services to engineers. More recently the service has been extended considerably. Clients now represent over 35 different industries. [TYM-1,7] Tymshare operates a communications network called TYMNET in addition to its timesharing computer service. Xerox 940's and PDP-10's form the backbone of the timesharing service and an IBM 370/158 will be added before 1974. [TYM-1,3]

5. Organization

Tymshare maintains large staffs at the headquarters and in its 6 regional offices and smaller staffs at 35 sales offices. The Boston office consists of a branch manager, 3 marketing representatives, and 2 technical representatives.

6. Hardware

There are 23 Xerox 940's and 3 PDP-10's on the system. Each PDP-10 has:

256 thousand words of core storage (56K user space)
250 million characters of disk
3 7-track tape drives
1 9-track tape drive

Each Xerox 940 has:

 64 thousand words of core storage (16K user space)
250 million characters of disk storage
  2 7-track tape drives

7. Offline Storage

Offline storage of tapes is available.

8. Line Printer

Presently only upper case printouts can be obtained in the high speed terminal located at the local office. By 1974 a full ASCII upper and lower case printer will be installed.

9. Operating System

Tymshare has developed the TYMCOM-IX and TYMCOM-X operating systems for the XDS-940 and PDP-10 respectively. These operating systems are as similar as possible to each other to allow for ease of user mobility from one machine to the other.

10. Programming Languages

FORTRAN II, FORTRAN IV, Super BASIC, Extended BASIC, CAL. [TYM-5,3]

11. Relevant Software

Tymshare has a package called SITE for analysis of U.S. Census data. The package is usually used to analyze market areas. [TYM-7] An information retrieval package called RETRIEVE can perform some limited text retrieval functions. [TYM-8] [TYM-9] The same files used by RETRIEVE can be reformatted to work with IML, the Information Management Library of programs for data management. [TYM-10]

12. Terminal Access

ASCII terminals at 10, 15 and 30 CPS.

13. Batch Use

Users of the interactive system can submit jobs to a batch facility.

14. Availability

6 a.m. to 12 midnight daily.

15. Backup

An incremental dump is performed twice daily and saved for 90 days. A complete dump of on-line data is done once a week and saved for 6 months.

16. Work Areas

One large room with a terminal is available. However, the same room is frequently used as a classroom.

17. Delivery Service

Delivery of tapes and bulk printout is usually by mail.

18. Tariffs

Connect time costs $10.00 to $16.00 per hour depending upon type of service. There is a minimum monthly charge which may range as high as $390.00. [TYM-14]

19. Contract

A two-page agreement sets forth the terms and conditions. There is a 30 day notice required for service cancellation.

1. Company

Address:

Com-Share Incorporated
2395 Huron Parkway
Ann Arbor, Michigan 48106

Local Office:

55 William Street
Wellesley Office Park
Wellesley, Massachusetts 02181

Telephone:

(617) 235-3650

2. Contact

Bill Barkeley

3. Date

July 30, 1973

4. History

Com-Share was started in the mid-1960's and went public in 1966. Their timesharing service is based on Xerox 940 and Sigma 9 computers. A-1 hardware and software is maintained by an in-house staff. The Xerox 940 services are sold in bulk to large users and are essentially dedicated machines. The Sigma 9 service is available to smaller users. There are 13 branch offices in the United States and several offices in Canada and England as well. A network of telephone lines makes Com-Share services available by local dial up from 55 cities.

5. Organization

There are three major divisions in the company. Finance and administration has 45 people, research and development 45 people, and marketing has 140 people. Except for marketing, most of these people are located in Ann Arbor. The local office has a marketing representative and a technical consultant.

6. Hardware

Each of the three Sigma 9 computers has:

512 thousand words of core storage (321K user space)
12 million words of rapid access device storage
576 million words of disk pack storage
2 9-track tape drives
1 7-track tape drive
1 high speed printer

7. Offline Storage

Offline storage of tapes and disk packs is available.

8. Line Printer

Only upper case is available on the high-speed printers located in Ann Arbor.

9. Operating System

The operating system, known as Commander II, was written by Com-Share. Interactive use and batch use are both monitored by this single operating system.

10. Programming Languages

FORTRAN, COBOL, BASIC and Assembly language.

11. Relevant Software

A proprietary software package known as COMPOSIT '77 supplies a data management facility. [COM-8] This package can display histograms in addition to traditional report generation.

12. Terminal Access

ASCII terminals at 10, 15 and 30 cps.

13. Batch Use

Batch control is effected by creating files with the same command language that is used on-line.

14. Availability

Weekdays 7 a.m. to 11 p.m.
Saturday 8 a.m. to 6 p.m.
Sunday 12 noon to 6 p.m.

15. Backup

A daily dump of on-line files is saved for two weeks. The monthly dump is saved for six months. A yearly dump is saved for five years.

16. Work Areas

A console is available at the local office but it is not in a designated user area and must be shared with the technical representative.

17. Delivery Service

Printouts and tapes are delivered by mail.

18. Tariffs

Connect time is charged on a floating basis which compensates the user for less than optimal response time. Generally this is below $12.00 per hour for terminals up to 30 cps. In addition the user is charged $.07 per computer unit. Customers with less than about $500 billing per month are subject to a surcharge. [COM-10]

19. Contract

A one-page agreement sets forth the terms and conditions. Customer must give 30 days notice of termination. [COM-11]

1. Company

Address:

University Computing Company
7200 Stemmons Freeway
Dallas, Texas 75247

Local Office:

3 N.E. Industrial Park
Burlington, Massachusetts 01803

Telephone:

(617) 272-6350

2. Contact

John Burns

3. Date

August 17, 1973

4. History

University Computing Company was started in 1963 and went public shortly thereafter. The company then became a subsidiary of the Wiley Corporation, a fairly diversified parent corporation with interests in data transmission, computer leasing and insurance. UCC offers remote batch services based on Univac 1108's. Major computing facilities are located in East Brunswick, N.J. and Dallas, Texas. The East Brunswick center serves the Northeast.

5. Organization

UCC maintains a very large organization in Texas and a user support staff of 6 or more people in New Jersey. The Boston office is just being established, and will consist of a branch manager, 2 sales representatives and 2 technical representatives before 1974. Presently there is only a branch manager.

6. Hardware

The East Brunswick, N.J. facility consists of a dual processor 1108 with:

192 thousand words of core
22 million words of drum storage
44 million words of disk storage
8 7-track tape drives
card readers
card punchers
high speed printers

7. Offline Storage

Storage is available for magnetic tapes but tape drive use is discouraged. Mounting of disk packs by users is not possible.

8. Line Printer

An upper and lower case high speed printer is located in New Jersey.

9. Operating System

The conversational interface to the UCC operating system is called FASBAC. It allows for editing, some file manipulation, and job submission. The operating system is called UCC EXEC and is similar to Univac 1108 EXEC2.

10. Programming Languages

FORTRAN V, COBOL, 1108 Assembler.

11. Relevant Software

UCC supports the Multiple Access Retrieval and Information System (MARS). MARS is often used to support management information systems and has special graphic plotting features in addition to report writing capabilities. MARS is heavily used by major oil companies.

12. Terminal Access

ASCII, EBCDIC, and correspondence coded terminals at 10, 15 and 30 cps.

13. Batch Use

Outside of the somewhat limited conversational file-handling facilities offered by FASBAC, the major use of the system is by submitting jobs for remote batch processing.

14. Availability

From 8 a.m. Mondays to 6 p.m. Saturdays.

15. Backup

No details regarding backup of on-line data were available.

16. Work Areas

No work area exists presently, but by early 1974 there will be a customer terminal room with 4 cubicles and desks.

17. Delivery Service

Printouts and tapes are delivered by mail.

18. Tariffs

FASBAC rates for connect time are $8.50 to $11.00 per hour depending on terminal speed. Computer resource units used by FASBAC typically add about $5.00 per hour. The Univac 1108 is charged at a rate of $1200.00 per CPU hour with a minimum charge of $15.00 per run. [UCC-5]

19. Contract

The agreement form was not available from the local office.

1. Company

Address:

Scientific Time Sharing Corporation
7316 Wisconsin Avenue
Bethesda, Maryland 20014

Local Office:

170 Park Hill Avenue
Boston, Massachusetts 02120

Telephone:

(617) 738-0710

2. Contact

Gautam B. Merchant

3. Date

August 6, 1973

4. History

Scientific Time Sharing was organized in May 1969. It claims to be the largest commercial supplier of APL services in the world. A considerable number of the people who originally implemented APL at IBM are now working for STS. The service has rapidly expanded since mid-1969 and is now available on a local dial up basis from 27 different cities across the country. [STS-1,2-3]

5. Organization

There were 57 people employed by STS in July 1973. In addition to the central staff in Bethesda, there are 16 branch offices. The Boston office has 2 people, a marketing representative and a technical representative. [STS-1,4]

6. Hardware

An IBM 370/155 with:

1 million bytes of core storage
1 billion bytes of disk storage
tape drives
1 IBM 1403 printer
1 card reader and punch

7. Offline Storage

Storage of magnetic tapes and punch cards can be provided. User disk files cannot be mounted on the system.

8. Line Printers

The high-speed printer in Bethesda has upper and lower case capability with a TN train. No local high-speed printouts can be made.

9. Operating System

The system operates under IBM's DOS.

10. Programming Languages

APL-PLUS is the only on-line language. FORTRAN, COBOL and PL/1 are available for batch file maintenance use.

11. Relevant Software

The "fulltext" retrieval system operates within APL-PLUS. It allows for some limited keyword retrieval of information. [STS-7] Another system called "vision" is being used as an adjunct to a microfiche document library. [STS-5,3]

12. Terminal Access

ASCII terminals at 10, 15 and 30 cps and also IBM 2741's.

13. Batch Use

Batch may be used to do file maintenance. Control of batch scheduling is retained by the system operations staff. It is not possible to submit a job to the batch stream from an on-line terminal.

14. Availability

Weekdays 8 a.m. to midnight
Saturday 9 a.m. to 5 p.m.
Sunday 12 noon to 5 p.m.

15. Backup

Incremental dump tapes are made daily. One tape each month is saved for a period of two years.

16. Work Areas

No local user work space is provided.

17. Delivery Service

Delivery of materials is by mail, United Parcel, air freight or Greyhound. Details can be arranged with the operations staff.

18. Tariffs

Terminal connect time is $12.00 to $15.00 per hour for low speed terminals. CPU usage is $4.00 per second. [STS-9,3] There are charges for user initiated backup and restoration of files.

19. Contract

A two-page agreement sets forth terms and conditions. [STS-9]